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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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HISTORY OF FISH PLANTING IN CALIFORNIA. *

By W. H. SHEBLEY, in Charge Fish Culture.

The work of planting and distributing fish in California began immediately after the Fish Commission of this state was organized. The California Fish Commission was created by an act of the legislature in 1870.

*An address delivered at the second annual convention of the Fish and Game Commission.

The act provided for a board of three commissioners to be appointed by the governor. Their duties were defined in the act as follows, "to provide for the restoration and preservation of fish in the waters of the state."

The members of the first board were Messrs. B. B. Redding, S. R. Throckmorton and J. D. Farwell. The first work of the newly appointed Commission was the introduction and acclimatizing of exotic species of fishes. Prior to the time and during the first few years of the Commission's activities, the California Acclimatizing Society had endeavored to introduce the eastern brook trout into California. Their first hatchery was established in the city of San Francisco near where the old city hall stood. This first hatchery in California was erected and operated by the Acclimatizing Society, but owing to impurities in the water, high temperature and the lack of knowledge of how eggs should be handled, the efforts to raise fish were a failure.

In 1872, the California Fish Commission employed J. G. Woodbury, who had been employed by the Acclimatizing Society, to cooperate with the United States Fish Commission (as the Bureau of Fisheries was first named), which had recently been created by a joint resolution of congress and approved by the President February 9, 1871. Mr. Woodbury was instructed to cooperate with the Federal Fish Commission and acclimatizing societies in the eastern states in an effort to introduce food and game fishes into the waters of California.

During 1871, the Fish Commission had procured the services of Seth Green of New York, one of the first and best fish-culturists in the United States, who with Dr. Livingston Stone and others were making their first experiments in fish-cultural operations in our eastern states. The first shipment of live fish to be delivered in California was a consignment of shad fry. These were transported across the continent in barrels. The shipment consisted of 12,000 shad fry from the Hudson River, New York, and was in charge of Seth Green and his assistants. Contrary to statements often made, they were consigned to the California Fish Commission, who arranged for the shipment to be delivered in California waters and paid all expenses. This shipment of shad fry left Albany, New York, on June 19, and arrived in Sacramento on June 26. They were taken from Sacramento and distributed near Tehama.

According to the reports and statements made by Mr. Woodbury to the writer in later years, there were only two thousand of these fish lost in transit. Approximately 10,000 of them were in good condition when planted near Tehama eight days after leaving New York state. Those who have handled shad know that they are considered a delicate fish, yet they were transported across the continent with a loss of only $16\frac{2}{3}$ per cent. We have persons in California who make the statement that many of our hatcheries are too far from the waters to be stocked. It is true that the farther fish are carried, the greater the loss, but the experience of trained fish culturists who have made a success of their distribution work, indicates that if instructions are carried out, there is not a place in California where fish can not be delivered with a minimum loss, if proper care is given the fish.

From 1871 to 1908, fifteen species of food and game fishes were introduced into the waters of this state. The time is too short to go into detail on the history of the introduction of all the fishes. Several species were introduced, but did not thrive. However we now have fifteen foreign

or exotic species thriving in California that are the result of the Commission's work.

One of the notable events in this line of work was the introduction of the striped bass which is no doubt the finest game and food fish in the state. S. R. Throckmorton, a member of the Commission in 1879, recommended to the board that striped bass be introduced into California waters from his native state, New York. The board, accordingly, took the matter up with Professor Spencer F. Baird, then United States Commissioner of Fisheries. As a result of this correspondence, Dr. Livingston Stone was instructed to transport a shipment of striped bass to California. Dr. Stone, at that time one of the leading fish-culturists of the world, collected from the Navesink River in New Jersey, 133 striped bass averaging about one and one-half inches to four or five



FIG. 31. Front view of the Yosemite Hatchery. Photograph by H. C. Bryant, June 3, 1927.

inches in length. Twenty-five of these died enroute. The remainder or about one hundred were planted in the Straits of Carquinez near Martinez. Several of these fish were caught during the first year in the lower waters of San Francisco Bay. A number were caught the following year.

The Commission was very desirous of getting this fish introduced into the waters of California and not being certain that the first shipment was increasing, decided to send J. G. Woodbury east after another shipment. In June, 1882, Mr. Woodbury proceeded to New Jersey and in cooperation with Seth Green, superintendent of Fish Culture for the New York Commission, caught 600 striped bass averaging six and one-half inches in length from the Shressbury River, New Jersey, near Red

Bank, where Dr. Stone had caught the first shipment above mentioned. There was a loss in the live cars before the start was made for California.

On July 17, 1882, Mr. Woodbury and his assistants left Red Bank, New Jersey, with 450 striped bass carrying them in what was known as the "New York can" having a capacity of 14 gallons of water. These cans had been designed by the fish-culturists of the state of New York for the transportation of trout. Mr. Woodbury had twelve cans of this type made for use on this trip. On July 25, he arrived with approximately 300 striped bass at Army Point in Suisun Bay where they were liberated from the cans. This shipment, and possibly some that survived the shipment made by Dr. Stone, was all the stock required to introduce into the waters of California a fish of great commercial value as well as one affording anglers fine sport.

In transporting these striped bass from Red Bank, New Jersey, to Suisun Bay, the attendants were busy the entire time. The water was aerated every fifteen or twenty minutes during the time the fish were in transit by an aerator contrived by Munroe Green, a brother of Seth Green, who was also an eminent fish-culturist of his day. The aerator was a cylinder about 18 inches long and six inches in diameter with a convex bottom which was perforated with fine holes. The top was arranged with a lid and a handle to manipulate it. There was a spike-like point projecting from the center of the perforated end so that when it was inserted into the cans the fish would not be mashed or crushed. By letting this cylinder or tube into the cans and pushing it slowly to the bottom until it was filled with water, then quickly removing it to the top of the fish can, a fine shower of water was produced that poured back into the can. This was well oxygenated and prevented the heavy impact of the falling water which is more or less injurious to fish on long journeys. The writer was presented with this aerator and used it continually for ten years in distributing fish in California. We also had others made with an improvement on the original invention of Munroe Green. These aerators are a great advantage over dippers as they do not cause such a heavy volume of water to descend on the delicate fish. Some people do not recognize the importance of preventing the fish from receiving undue concussion as I understand that it has been claimed that young salmon and trout can be dropped over a dam two hundred feet or more in height without doing them any injury.

Before the 14-gallon "New York can" was used in California, a number of different type cans had been purchased from some of the commissions in the eastern states and also some furnished by the United States Fish Commission. One type of can that was recommended by the Federal Commission was made of medium light tin and reinforced or jacketed with a wood exterior to keep the can cool. This type of can was used in distributing fish from the San Leandro Hatchery and from the Shebley Hatchery in Nevada County. It held approximately ten gallons of water and did good service for a number of years. It was serviceable when handled by the hatchery men, but railroad employees and others handled it so roughly that a heavier can was decided on.

Another can that was in use by the United States Fish Commission and a number of the eastern commissions was made with straight sides. The top was fastened on hinges and made to fit tightly when in place with a clasp. To prevent the water from spilling through the

rim of the lid there was a groove entirely around the edge in which a heavy rubber band was placed so that the contact between the lid and rim of the can was water tight. The lid had a hole in the center through which a pipe or tube was inserted and air was forced through the pipe or tube by the use of small bellows such as those used in coal grates to start the fires burning. There were many other patents and inventions of different types of cans, but they were not practical. One inventor had a box patented that would carry fish without an attendant. It was so arranged that the movement of the train or whatever vehicle was used, would cause the water to splash through a perforated plate on the bottom of an ice chamber. Thus the water would be aerated as well as kept cool. No provision was made for delays when the train was not in motion. One of our Commissioners was so carried away with the idea that he ordered ten or a dozen of these cans in spite of our protests that an attendant would have to accompany the fish to give them the proper care and aerate the water if the train should stop over 15 minutes at one time. To convince the Commissioner that our experience in handling fish was of some value, we insisted that he have a shipment made without an attendant. This he agreed to, and a shipment of trout was sent out with instructions that they were not to be interfered with until they arrived at their destination. As was to be expected, all the fish were dead on arrival. We heard no more about the self-aerating cans.

Cans charged with oxygen gas have been tried in Europe as long ago as 1890. The plan has also been tried out in this country. While the fish can be carried by this method, these plans are not practical. Cans with an air chamber charged with compressed air have been quite successful, but they are expensive. In the judgment of the writer, an attendant skilled in the handling of fish should accompany all shipments, at least until the fish leave the railroads.

The different sizes that fish should be held until shipped has been a matter of controversy and argument for the last fifty years as reports of the different states and governments as well as in our own state records show. The writer, who probably has handled as many fish personally as any fish-culturist in the United States, and some of our experienced fish-culturists are practically agreed on the size fish that carry the best. That is when they are two or three months old, before they become too soft and fat and fatty degeneration of the vital organs takes place. When older fish are shipped they have to be starved to get them in condition to ship and this takes time. As they are naturally larger a smaller number must necessarily be carried in the cans and consequently there is an added expense with no appreciable gain in results. We have shipped yearlings and fish at all ages, but medium sized fingerlings carry better than larger fish and if given a wide distribution, are sure to give good results. By a wide distribution, I mean the way we use to distribute the fish by depositing them on the ripples and in shallow water, five thousand to ten thousand to a mile of ordinary sized trout stream. For example, in a stream running fifty second-feet of water, ten thousand fingerlings to a mile would be an ample stock. For a period of ten years, the writer planted practically all the fish that were shipped from our hatcheries and had an opportunity to check on the results.

In the early days of the introduction of new species of fishes and in the stocking of depleted streams, the Commission selected the waters

to be stocked and had the fish planted by their fish-culturists. A great many lakes and streams in this state were stocked where the waters were depleted of their fish life and new species introduced and endeavors made to stock lakes and streams which experiments proved were not suited for certain species.

Some of the notable examples of fish planting and the introduction of new species are among the following: The Truckee River was stocked by the Commission with rainbow trout from McCloud and Klamath rivers, also with rainbow fry hatched from eggs collected from Goose Lake, Modoc County. The first rainbow trout introduced in the Truckee River were from eggs collected on the McCloud River. Later the Klamath River fish were introduced and before the Klamath River fry were planted, fry hatched from eggs collected from Goose Lake were introduced into the Truckee River. The upper reaches of Truckee River

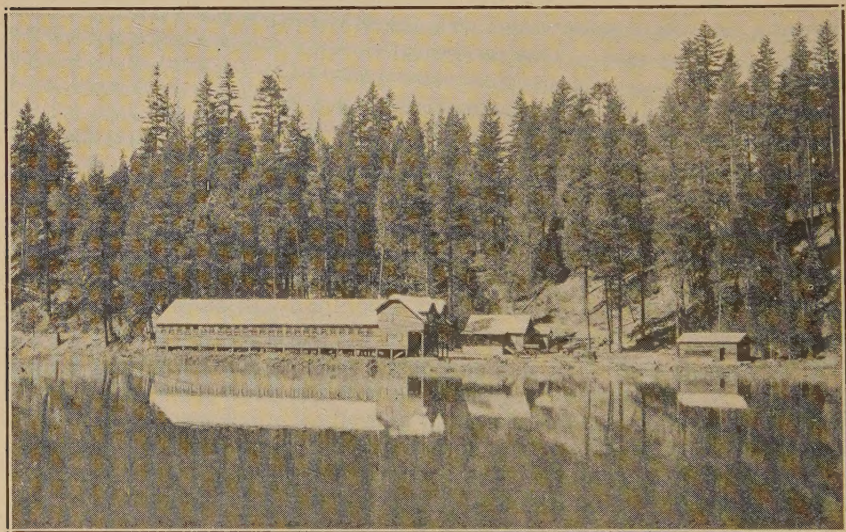


FIG. 32. The new Burney Creek Hatchery, Siskiyou County, built by the Pacific Gas and Electric Company. Photograph by George McCloud, April 24, 1927.

near the outlet of Lake Tahoe were stocked with Loch Leven trout twenty-five years ago when it was found that no other species would remain in that part of the river owing to the fluctuating flow of water caused by the opening and closing of the gates at the outlet to the lake.

Bear Lake, San Bernardino County, was stocked with rainbow trout and black spotted trout transported from the Nevada County hatcheries to San Bernardino by rail to Colton and from Colton via team and pack train over the Santa Ana River trail in 1885 which was before there was any road up Mill Creek Canyon. The only road reaching the lake at that time was by desert via Victorville, which was too hot and the distance too great to make by team. It took four days and nights from the time the fish left the hatchery in charge of the writer, until they were deposited in the lake. Out of twelve cans the loss on this trip

was less than 8 per cent. Later a number of other shipments of Klamath River trout were planted in Bear Lake. The entire region above Yosemite Valley was stocked with fish from the state hatcheries. The first shipment planted in Merced Lake, Lake Ostrander and Bridal Veil Creek was in the fall of 1892. The shipment consisted of eastern brook trout, black spotted trout and rainbow trout. These fish were hatched at Sisson Hatchery, now known as Mt. Shasta Hatchery, transported by rail to Raymond, then by horse teams to Wawona. They were taken from Wawona to Mono Meadows, the farthest point the army ambulance wagons could proceed. They were then transferred to army pack mules and conveyed to the waters to be stocked. The writer had charge of this shipment and the loss from the hatchery to the lakes and streams was less than 10 per cent. This was a hard trip not only on the fish but the attendant, and it was considered a remarkable example of fish distribution at that time as the United States Fish Commission had advised our board that in the judgment of their fish experts the trip could not be made without a total loss of all the fish.

At that time the Merced River was free of obstructions and the steelhead and salmon ascended the Merced River to Wawona and into Yosemite Valley as far as the rapids below the Vernal Nevada Falls. There were a few low dams in the river, but they were not high enough to prevent the steelhead and salmon passing them during the spring floods.

Hundreds of lakes and streams were stocked during the period from 1871 to 1893 by the Commission without outside assistance. The practice was for the board to write letters to prominent citizens in different parts of the state, to county officials and members of the legislature, asking them to recommend streams and lakes which were in need of stocking. On receipt of answers to these letters, they were given due consideration and the board consulted with their fish-culturists and made the allotments according to what their judgment deemed best for the waters requested to be stocked.

About 1893 the Commission realized that the work of stocking streams required the assistance of railroads and citizens interested in keeping up the fish supply in the streams and lakes. Accordingly, application blanks were gotten up following the same form generally as was being used by the eastern commissions and the United States Fish Commission. These blanks were mailed out to residents of the different parts of the state where the waters needed stocking because of over-fishing. The name of the applicant was required, the names of the waters to be stocked, the nearest railroad station to point of planting and a statement from the applicant that all expenses of team hire, ice and expense of attendants were to be borne by the persons making application for the fish. When these applications were filled out, the fish were allotted and the planters from hatcheries made the distribution.

In 1890, the Southern Pacific Railroad Company issued the first free transportation for local work. They gave annual passes to J. G. Woodbury, E. W. Hunt and the writer so that the distribution of the fish could be made without expense to the state. Prior to this time, all the shipments were made by express and the exorbitant rate of expressage and the small sum that the legislature appropriated for the work of

the Commission, necessarily caused the number of fish to be planted to be reduced to a small number.

The writer, accompanied by Mr. Woodbury, then superintendent of Fish Culture or Superintendent of Hatcheries as was his official title, went to the office of Collis P. Huntington, and made a request for annual passes with the privilege of transporting fish free of charge in the baggage cars. Mr. Huntington replied, asking "Why should we carry fish free of charge for the state?" When it was explained to him that the tourist travel depended on keeping the lakes and streams well stocked with fish, he said he would have the matter investigated and if it was of benefit to the company, he would help us out. A few days later I called on him and he gave me the passes and told me that they would be pleased to assist us in having the passenger trains stopped at any point where we desired to put off fish, whether it was a regular station or not. The Southern Pacific Railroad has been giving us transportation ever since as have all of the other roads. This was somewhat different from when we shipped our fish during the period from 1884 to this date, when we were often four or five days on a freight train in a box car with 12 or 15 cans of fish. I recall an instance in 1885 when a shipment of trout consigned to the streams of Santa Clara County were five days en route from Colfax, Placer County, to San Jose. The railroad gave the Commission a special rate on a box car. The fish, ice and aerators were placed in the box car at Colfax. The fish had been raised in the hatchery on my father's place in Nevada County and transported on the narrow gauge railroad to Colfax. Here they were placed in the box car with the attendants. Twenty-four hours later the consignment of fish reached Oakland and the box car placed on a siding for two days and then picked up and hauled to San Jose where the fish arrived in the early morning, the fifth day after leaving the hatchery. Even on this long trip the loss was not great. The citizens of San Jose conveyed the fish to the streams and considered the work well done under the circumstances.

Beginning with 1893, the Commission broadened its distribution of the trout from our hatcheries. The writer had become familiar with all the important lakes and streams, having been on the road every season planting fish and making investigations for the previous nine years. A planting program was arranged with the assistance of J. P. Babcock and others interested in fish-cultural work. He was placed in charge of the Sisson Hatchery where plans were made to enlarge and improve the station. In 1895, R. W. Requa, who had been working under G. H. Lambson in the car messenger service of the United States Fish Commission for a number of years, was employed as shipper or fish planter for our Commission. With instructions regarding locations of streams and lakes and with the assistance of sportsmen's clubs, many private individuals, who had become interested in certain lakes and streams, and the deputies, the trout in California were given a wide distribution in depleted lakes and streams and hundreds of lakes and streams that were barren of fish life were stocked.

As the demand for trout became greater, the Commission issued an application blank, so that when persons or associations requested fish for a certain stream or lake, all necessary information could be had regarding the waters desired to be stocked, the point on the railroads where the fish were to be delivered and whether the waters were

open to the public for fishing purposes. Prior to 1916 when the Fresno administration office was abolished, the fish planting work received valuable assistance from A. D. Ferguson and the deputies in the Fresno division. Many hundreds of lakes and streams were stocked by the deputies under the direction of Andy Ferguson. The late S. L. N. Ellis took great interest in fish planting in the southern range as well as other deputies. Among those who assisted in this work that are now in the employ of the Commission are deputies Edward Smalley, F. A. Bulard and others, not overlooking the able assistance given the Department of Fish Culture in past years by deputies H. I. Pritchard when he was in charge of the Los Angeles office, J. H. Gyger, Webb Toms and others. Some of the old timers now passed to their reward gave this work their particular attention by meeting the more important shipments of fish in their districts and assisting in the work.

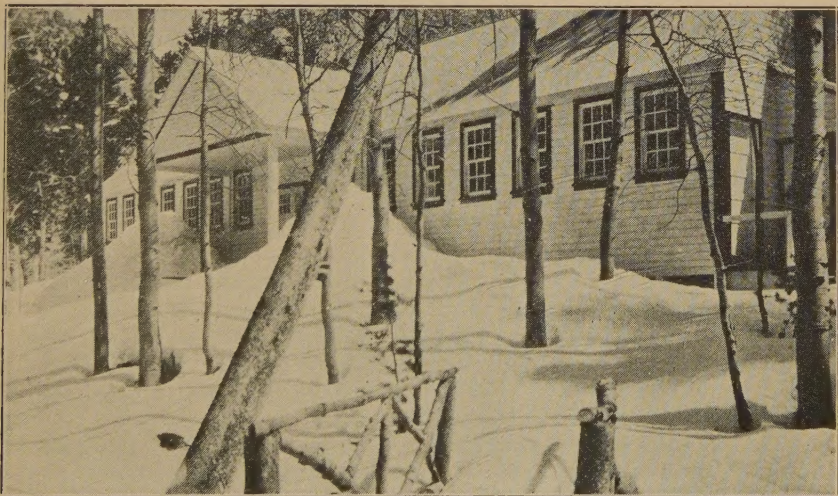


FIG. 33. The new Fern Creek Hatchery in Mono County, erected 1926. Photograph by George McCloud, April, 1927.

The late Henry J. Abels supervised the distribution work in Santa Barbara County for nearly 20 years and there never was a complaint from his district. The game wardens have always been of assistance wherever their services were required in fish distribution work.

As the demand for fish increased with the ever-increasing population of the state and the capacity of the baggage cars on the different railroads was often overcrowded with fish cans, the Commission, in 1907, requested an appropriation from the thirty-seventh session of the legislature to purchase and equip a fish distribution car. The appropriation was passed and through the courtesy of E. E. Calvin, general manager of the Southern Pacific Railroad, we were enabled to purchase a 60-foot baggage car. The car was placed in the shops at Sacramento and an engine, air compressor, air pipes, liberators, etc., was installed. The car has a capacity of from 100 to 110 cans and when placed on the road twenty years ago was one of the best equipped fish cars in the world. The car is now old and as many new ideas have been evolved since that date, a new and more modern car should be built as soon as funds are

available. In fact the Commission should have two modern steel fish distributing cars built at an early date. In 1915, we rented a baggage car from the Southern Pacific Railroad Company and equipped it with an aerating system, with the air pumps driven by a gasoline engine. This car has been in use each season for the last eleven years. We have to return the car to the company at the end of the distribution season and are under the expense of removing the engine and equipment and installing the same again the following spring.

In conjunction with the distribution system on the railroads, the Commission operates nine hatcheries where the fish are planted by the hatchery foremen and crews by the use of trucks. These fish are always delivered in good condition as the trips are short and the fish are carried on trucks and can be given better care. These are mostly small hatcheries that are used to furnish a supply of fish for nearby streams and lakes. In a number of the counties where the mountainous regions are inaccessible to trucks or wagons, the fish are transported by pack animals. Cans were built for this purpose which were box shaped about 30 inches long and about one foot wide with the mouth of the can inclined to one side so the lids could be removed, the fish examined and the water changed or reiced.

The Fresno Division has a collapsible container made of canvas that was used successfully on some of the long hard trips in the high Sierra range.

A change in the methods of transporting trout has become necessary since the use of auto trucks and paved highways on which the cans are carried over the greater part of the distances from the railroad stations and the hatcheries. In past years when fish were being conveyed to the waters to be stocked by wagons over unimproved mountain roads, the jolting of the wagons caused the water to splash against the sides and breasts of the cans and thus gave sufficient aeration in transporting fish. All that the attendants had to do was to ice the cans so as to keep the water at the proper temperature during the time the wagons or trucks were moving. But this can no longer be done. The smooth paved highways and the use of auto trucks does not cause as much agitation of the water in the cans as the motion of a baggage car on an express train. So it is necessary in transporting the fish, after they leave the fish distributing cars or the hatcheries, to so place the cans that they can be aerated every 20 or 30 minutes, otherwise the fish will smother or die from lack of oxygen. This is not a hard matter to do, as the time of delivery to the average stream or lake where the waters are to be stocked has been reduced to such an extent that it is no longer a hardship such as we had to endure in the years before the advent of the auto truck for the distribution work. Many of our trips twenty-five and thirty years ago would take from 24 to 30 hours after leaving the railroad, as the average time of the heavy freight or even delivery wagons did not exceed three or four miles an hour when ascending mountain grades. Now the auto truck speeds along at the rate of 15 to 25 miles an hour and the destination point is soon reached.

Attention to all this has been stressed in our instructions to persons transporting and planting fish. A number of the applicants carrying out the instructions and suggestions have constructed rest ponds where the fish may be held for a period of five or ten days at the end of roads accessible for travel by auto truck. The fish placed in such ponds are

then distributed at leisure, generally by pack animals to the more remote and inaccessible lakes and streams in higher ranges of the mountains. This system of giving the fish a rest after the long journey by distribution car and auto truck is very beneficial as they are then in fine condition for pack animal trips to waters that they are consigned to, otherwise if they were transferred directly to the pack animals, they would not carry so well. Some planters rest their fish in the streams by tying hobbinet or mosquito netting over the mouths of the cans and placing them on their sides in the bed of the stream so that there will be a constant flow of fresh water into the cans and this gives the fish a chance to recuperate. They can then be carried on for many miles without any appreciable loss.

In transporting live fish, there is more or less loss. For in every shipment there are weaklings caused by structural defects in the embryos



FIG. 34. Rush Creek Egg Collection Station, a fertile source of black-spotted trout eggs. Photograph by George McCloud, April, 1927.

before hatching and as among all living things, these must of necessity die. Some die in the early stages.

People do not realize the number of cans required to ship from 25,000,000 to 30,000,000 trout from the different hatcheries. During 1925 there was shipped approximately 17,000 cans of trout to the different streams and lakes in this state. Outside of two or three unavoidable losses the fish were planted with the normal loss that takes place in handling trout during the distribution season. There is a tendency, or we might call it an atavistic interest in all wild life, perhaps inherited from our ancestors, to pay more attention to fish or game than to any other thing with which we come in contact. I have noticed it hundreds of times where persons are visiting a hatchery or where someone is planting fish. Fifty dead fish attract more attention than 10,000 strong, healthy fish. I have had intelligent men and women while visiting hatcheries where I have been in charge and where there were millions of strong healthy fish notice a hundred or two weak or dead

ones that had not been removed from the troughs and make severe criticisms regarding the incompetency of the fish-culturists or the superintendents. I recollect occasions where some member of the crew had kindly taken one-half hour or an hour to show visitors around the ponds and hatcheries, explaining in detail how the work of propagating and rearing fish was carried on, and as soon as the employee returned to his work, someone in the party would come into the office and ask me if I was aware of the fact that there were two or three dead fish in some pond or trough that had not been removed. I always replied that fish were subject to disease and death the same as all living things and that in proportion to the numbers handled, the average death rate, when there were no epidemics, probably was no greater than among the human family. They would always go away with a puzzled look, evidently thinking that there was something wrong or else none of the fish would die. The same is true in the distribution work. If a few hundred fish die en route or they are found where a plant has been made on some lake or stream, the story soon goes the rounds that a whole shipment of fish were lost at such a place. These stories are repeated and like all stories in which somebody has indirect interest are continually told. This often goes on for years.

It is true that shipments have been lost, but very few by the Commission's employees and not as many as is generally supposed by the planters connected with clubs. Then it is a case of not carrying out instructions. Many of the applicants are better qualified to superintend the planting of fish than some of our own men as many of the fish planters, connected with clubs and organizations and individuals have planted fish for many years. We have among our planters connected with clubs, men who have planted and supervised the work in their districts for twenty-five or more years. Several of the young men now applying for fish are the sons of men to whom fish were given years ago with instructions how to plant them and how to do the work properly, and these young applicants are taking the same keen interest in this work as the generation before them.

I mention these facts as they all have an interest in the history of fish distribution in California. I can not give more than a brief outline of this work as it would take a book of several hundred pages to cover the subject thoroughly. A complete record would be of interest to all sportsmen and others interested in fish planting work in California, provided all of the more interesting phases of the work were written up. All that I can say in conclusion is that we have accomplished more than the general public will ever realize or care to realize, and when I say we I include all of our commissioners, deputies, fish-culturists and those who have cooperated in this great work. Throughout the years a strong loyal force of employees on the Commission, has, for inadequate pay, done a big work for our state and I hope that the future years will be as fruitful in results as the past.

FOUR NEW HATCHERIES FOR CALIFORNIA.

By W. H. SHERLEY.

During the last year the California Fish and Game Commission has had constructed four new hatcheries. These are located in regions where fish cultural problems were a serious question and very much needed.

The new Burney Creek Hatchery is situated on Burney Creek in Shasta County, one mile below the beautiful Burney Creek Falls in Burney Creek State Park. The Yosemite Hatchery is located in the famous Yosemite Valley, the Big Creek Hatchery, in Santa Cruz County, is on Big Creek, which has its source on the borders of the California State Redwood Park, and the Fern Creek Hatchery, on June Lake, Mono County.

BIG CREEK HATCHERY.

Millions of steelhead eggs have been hatched in the past at the Brookdale Hatchery and the resulting fish planted in the streams of Santa Cruz County and other contiguous counties. But the Brookdale Hatchery has of late become a considerable problem. Its water supply has been a continual source of trouble. Each season the water put to a domestic use by the residents of Brookdale in their summer cottages greatly reduces both Alba and Clear creeks, where the hatchery supply is obtained. This matter was taken some years ago before the Railroad Commission, but it ruled that domestic use was paramount and had to be considered first and that the hatchery had to depend on whatever amount was left in the creeks. Not only has the supply been getting less each season, but the water was being polluted by the trash that worked from hillsides, where the cottages were located, into the creeks. The water was further rendered unsatisfactory by being held in a swimming pool above the hatchery. In the swimming pool the water became very warm and when it was turned into the creek, it caused the temperature of the creek to rise and the development of certain organisms deleterious to fish life.

Under these conditions it was deemed advisable to abandon the Brookdale Hatchery and move to a more favorable location. A lease was obtained on land bordering Big Creek in Santa Cruz County about three-fourths of a mile from Swanton, where the Scott Egg Collecting Station is located. The site consists of approximately five acres. It was obtained through the kindness of R. L. Cardiff, manager of the Coast Counties Gas and Electric Company. The directors of the company also were very kind in giving the state a lease for this desirable site. The hatchery has a capacity of one and one-half million trout and is so arranged that additional troughs can be added when the demand is necessary.

Scott Creek, from which the egg supply will be obtained for Big Creek Hatchery, has furnished many millions of steelhead trout eggs during the last twenty years. When operations to collect steelhead trout eggs from this stream were begun, the run of adult fish, or spawners, was greatly reduced by excessive fishing. The problem was solved several years ago when the legislature created District No. 14 and set aside as a state fish preserve the waters of Scott Creek from their junction with Mill Creek to their mouth in the ocean. This preserve when properly patrolled to prevent poachers from catching the fish planted each season, as well as the spawners on their way from the ocean to the trap at Swanton, will furnish an average of three million eggs each season. At present there is a special patrolman on this creek whose duty it is to watch for persons attempting to take fish from the stream as well as to see that the pumping plants are properly screened and the screens kept in place at all times when the pumps are in operation.

At the time the legislature passed the law creating a fish preserve of Scott Creek, there were no diversions of water below the traps in the area where the fingerlings were distributed, but since this time the Division of Water Rights has granted several appropriations for pumping plants, the water to be used for irrigation. This has had a serious effect on the young of the steelhead trout. Indeed, during seasons of drought the greater part of the water of Scott Creek has been used for irrigation to the unquestionable detriment of the small fish. It has always been an open question in the Department of Fish Culture as to the legality of water diversions. The legislature, in setting Scott Creek aside as a fish preserve, certainly did not intend to allow the water to be diverted for other purposes. A fish preserve without water would be like a game preserve without forests or brush fields, only to a greater extent, for animals possibly could live for a time without forests or brush fields, but it is certain that fish can not live without water. If some agreement



FIG. 35. The new Big Creek Hatchery, Santa Cruz County, built to replace the Brookdale Hatchery.

can be reached this condition will be improved, but during seasons of drought the problem is and has been serious.

Distribution can be made by truck to all the principal streams in Santa Cruz County as the hatchery is but three quarters of a mile from the highway skirting the coast. In fact easy delivery can be made to waters of Monterey County and to points as far north as San Mateo and Alameda counties.

BURNEY CREEK HATCHERY.

The Pacific Gas and Electric Company in the development of their Pit River hydro-electric projects planned several dams that would prevent the movements of the migratory trout and salmon to the upper reaches of the Pit River and to the large tributary streams, namely Burney Creek, Hat Creek, Clark Creek, Salmon Creek and others.

After the completion of the dam for Pit Power Plant No. 3, a survey of the Pit River region was made by the Department of Fish Culture to determine the best location for a hatchery to be built in lieu of fishways to furnish fish for the upper reaches of Pit River and its tributaries as well as for the lakes that would be created by the damming up of the water for the different power projects.

After an extensive study, a location on Burney Creek, near the dam for Pit Power Plant No. 3, forming Lake Britton, was selected as the best site for the hatchery. Lake Britton is formed by a dam approximately 125 feet high constructed across Pit River about two miles below the mouth of Burney Creek. The lake is approximately nine miles long. Hat Creek flows into the lake near its head. Burney, Clark and Salmon creeks and other smaller streams also flow into the lake. The



FIG. 36. Front view of the new Burney Creek Hatchery, showing hatchery building and superintendent's cottage. Photograph by George McCloud, April 24, 1927.

hatchery site is one-half mile from the shores of Lake Britton on a flat on the west bank of Burney Creek on property immediately adjacent to the boundary line of Burney Creek State Park.

Plans were made for a hatchery with a capacity of three and one-half million fish, so arranged that additional hatchery equipment could be annexed as occasions may demand. These plans were submitted to the Pacific Gas and Electric Company last fall and met with their approval. They began work on the buildings almost immediately. The station was completed during May and consists of a hatchery building with living quarters upstairs for some of the help, a superintendent's cottage, garage, feed preparing room, all completely equipped for next season's operations. The buildings are all substantially built and are a credit to the company. No expense in material or labor in the construction of this station was spared and its capacity will not only keep up the supply of trout in the Pit River region, but will afford enough fish to

supply other parts of the northern and eastern parts of the state when the station is in full operation.

Plans are being formulated for the installation of salmon racks and traps near Hagan Flat which is farther down the river and below the proposed power plants. Here the eggs of the salmon can be collected and transported to Burney Creek Hatchery, there to be hatched and the resulting fish transported by trucks to a point below the last diversion on Pit River or below the lowest power house and there distributed. The Hagan Flat project will be an auxiliary to the Burney Creek Hatchery. Thus both salmon and trout will be hatched there.

Eventually the entire Pit River canyon as far as the mouth of the McCloud will be developed for power purposes. The dam forming Lake Britton is to be built across Pit River about two miles below the mouth of Burney Creek and the water diverted through a tunnel to Pit Power House No. 3, diverting approximately the whole river for a distance of nine miles.

Pit Power House No. 4 will be located eleven and one-half miles farther down the river. The water will be diverted below Pit Power House No. 3 through a tunnel that will have its outlet opposite Hagan Flat, twenty-three miles from Montgomery Creek village on the state highway. Pit Power Houses Nos. 5 and 6 are contemplated to be built later on farther down the river. These, no doubt, and other hydro-electric projects will be built in the next few years. The Commission can arrange to collect the salmon eggs below any of these projects, by a system of racks and traps, and the eggs transported to Burney Creek Hatchery, if no better site is found later on for a salmon hatchery, when all these projects are developed. For the present, the Burney Creek Hatchery and the Hagan Flat salmon racks and traps will adequately handle the fish problem of the Pit River region.

The fishes common to Pit River are the rainbow trout, ripple pike (*Ptychocheilus oregonensis*), and other members of the minnow family, chinook salmon and suckers. Pit River afforded excellent spawning grounds for the salmon before the construction of the dams and power houses. Excellent trout fishing could also be had from the mouth of the McCloud River to Pit River Falls. The principal tributaries of the Pit River below the falls are McCloud River, Hatchet Creek, Squaw Creek, Montgomery Creek, Roaring Creek, Burney Creek, Rock Creek, Clark Creek, Hat Creek and Salmon Creek. Fall River, which formerly joined the Pit above the falls, is now diverted through a long tunnel and its waters, after passing through Power House No. 1, enter the Pit River a few miles above the head of Lake Britton. Fall River has two species of native trout that are non-migratory. It is proposed to keep all these streams stocked from Burney Creek Hatchery.

YOSEMITE HATCHERY.

During 1919 an experimental hatchery was operated near Happy Isles in the upper end of the Yosemite Valley to determine whether the water from the Merced River flowing through Yosemite Valley was suitable for hatchery purposes. A temporary hatchery was installed and several hundred thousand trout eggs were hatched and developed

into healthy fry. The experiment determined beyond any question that the water was excellent for hatchery purposes. Owing to lack of funds and some provisions in the lease that the then Secretary of Interior insisted on having incorporated, the project for the time was abandoned. Last summer a new lease satisfactory to the Commission was given by the Park Service through the Secretary of the Interior for a period of twenty years. Plans were made by the Department of Public Works for a modern hatchery and work was begun early in the fall of 1926. The hatchery was so near completion by the time eggs were ready for allocation to the different hatcheries that the Commission placed 590,000 steelhead trout eggs in the hatchery. The resulting fry and fingerlings will be reared and distributed in and adjacent to the many lakes and



FIG. 37. The Yosemite Hatchery, showing stonework and cedar shingles. Photograph by H. C. Bryant, June 3, 1927.

streams of the Yosemite National Park where thousands of tourists annually spend their vacations.

Investigations will be made during the coming summer to determine whether sufficient eggs can be collected from Lake Eleanor, and other lakes in the park, to supply the hatchery. It is very essential that an adequate supply of eggs be had to furnish the Yosemite Hatchery, because the demand on the lakes and streams of the Yosemite National Park is very great.

During the coming fall and winter, eggs from the fall and winter spawning species will be placed in the hatchery so that the fry will make a fine growth before the eggs of the spring spawning species are shipped to the hatchery.

The Park Service, under the terms of the lease, are to make the distribution of the fish within the boundaries of the park. This will be a

great advantage. The fish can be taken from the hatchery at the proper age and size and distributed to the most remote regions of the park and at a time when conditions are most favorable. Fish for distribution in territory contiguous to the park can be hatched and distributed from Yosemite Hatchery when the hatchery is operated to its full capacity.

The thousands who go to Yosemite each season will find this hatchery both interesting and educational. Indeed, during the short period that the hatchery has been in operation, literally hundreds of visitors have called daily during the visiting hours. It is necessary to have the hatchery closed to visitors part of each day to enable the fish culturists to care for and feed the fish.

The Yosemite Hatchery has a capacity of 1,500,000 eggs and the excellent condition of the water will cause the development of as fine a lot of fish as can be raised in any hatchery in the state. The hatchery will give thousands of persons an opportunity of seeing how fish cultural operations are conducted by the Commission. When the grounds are ornamented, the aquarium completed and full of the different species of fish that are to be found in the Yosemite Park region and visitors can be shown the eggs and embryos, the hatchery will be one of the most attractive places in the Valley.

FERN CREEK HATCHERY.

In the fall of 1926 a fine new hatchery located on June Lake, Mono County, was completed. It is a frame building painted white with a galvanized iron roof. Two cabins are provided for help. This hatchery was designed for the eyeing of steelhead eggs and eastern brook eggs taken in June Lake and eastern brook eggs taken in Gull Lake. The situation has proved very satisfactory as the water which is taken from either, or both, Fern Creek or Reverse Creek is pure and clear. June Lake was first stocked with steelhead trout in 1922 and forty to sixty thousand fingerlings have been planted there annually since. Consequently an abundant supply of steelhead trout for spawning is available. This year the steelhead trout which were seined from the lake averaged from four to five pounds and there were some as large as $10\frac{1}{4}$ pounds. Well over a million eggs were secured and eyed the past spring. This hatchery, containing thirty-two troughs which will supply the immediate vicinity with fish, is typical of a small local hatchery designed to take care of local plantings.

HUNTING AND FISHING REMINISCENCES.

By WALTER R. WELCH, Field Assistant.

"Well, Walt! If the boys of the present generation could now enjoy such duck shooting on the old marsh and along the sloughs as you and I had when we were boys, what a time they would have."

Thus remarked Claud Fox of Redwood City during a recent discussion of the past and present wild duck supply and shooting conditions on the marshes along the upper San Francisco Bay.

Claud and I were schoolmates and boyhood friends. During the early eighties, at the request of his father, I took him on his first wild

duck and goose shoot, and consequently, we were companions on many duck hunts.

Claud's remark and our discussion of duck shooting on the marshes over forty years ago caused me to lapse into a reminiscent mood and, at this time, when the protection and conservation of fish, game, song birds and forests is attracting and receiving so much general attention from people throughout the state, I am wondering how many of the present-day generation realize and appreciate the bountiful supply of wild life to be found in this state in what seems to me to be only a few years ago when it could truly be said that "California is a Sportsmen's Paradise."

At that time the lakes, rivers and streams teemed with trout, salmon and other game and food fish; the hills and valleys were alive with quail, deer and other game; the waters of the bays and the sloughs of the marsh lands reflected the glimmering wings of millions of ducks, geese and shore birds; and with very little trouble or expense one could go afield or astream and within a radius of fifty miles of San Francisco and in a few hours, return with a well-filled bag or creel.

In those days, nimrods' name went forth as a "mighty hunter" and the angler was known as "a fisherman." The "tools of the craft" at that time were muzzle-loading shot guns and rifles, a fishing rod was secured from a willow along the bank of the stream, and the reputation of the "hunter" and "fisherman" depended upon the amount of game he killed or the fish he caught.

During the Pioneer days, and even as late as the nineties, fish and game of all species and classes were caught and killed without regard to season, number, size or sex, and were commercialized for dollars and cents in the open markets of the state, and not as it should have been and is at the present time—as a valuable asset and resource of the state for the benefit of the people in general in their pursuit of recreation, pleasure, health and happiness.

The writer was born and raised in California and ever since he was able to "tote" a rod or gun has never missed an opportunity to be afield or astream hunting or fishing.

I became afflicted with "hunt and fishitis" at the age of about eight years, and clearly and distinctly do I recall spending many a moonlit night during the late fall in the early seventies seated in a duck shooting blind on the shore of the lower San Francisco Bay, where is now located the west approach to the Dumbarton Bridge east of Palo Alto.

As evening approached and night drew on, flock after flock—containing thousands of ducks and gaggles of geese by the hundreds—were to be seen on all sides, winging their ways to the grain fields in the vicinity of where are now located the towns of Mayfield, Palo Alto, Menlo Park and Redwood City.

From the mud flats and marshlands bordering the bay shore came the quack of ducks, the honk of geese and cranes, the call of the willet and curlew, the whistle of plover, snipe and shore birds, and the cackle of rail by the thousands upon thousands; while in the grain fields could be seen the flash and heard the report of every kind of "shooting iron" from the old smooth bore army musket with its cap the size of a small plug hat and its iron ramrod, to the 10 gauge muzzle-loading shotgun, loaded with five drams of black powder and one and one-half ounces of

shot. While I don't remember the exact number of ducks and geese I bagged that night, I had all I could carry home.

Being possessed of an insatiable desire to be afield with rod and gun, during the late seventies and at the age of about sixteen years, I secured a small sloop for use as a house boat, and having an old market hunter for a partner, I entered the vocation of hunting ducks, geese and shore birds on the bay and rivers for market; and also grebe for their skins and seal for their oil and skins.

Our equipment as market hunters consisted of a "tule splitter" and scull boat for use on the river and bay, one 12 gauge, one 10 gauge and one 4 gauge shotgun, a 45-70 caliber Winchester rifle, and two hundred brass shotgun shells. Powder and shot were purchased in 50 and 500 pound lots and "primers" and wads in 2500 and 5000 lots.

A good "tule splitter" could be purchased for from \$8 to \$12 and a fourteen foot round bottom cedar scull boat, with iron center board, cost \$70, or at the rate of \$5 per foot.



FIG. 38. A mother murdered. An effective exhibit installed by Deputy W. B. Sellmer at the Marin County Fair, August, 1926, and at the Palo Alto Christmas Party. One of the fawns in the picture is alive and the other mounted.

A twenty-five pound keg of "Hazzard's F. F. G." black powder cost from \$10 to \$12.50; shot could be purchased at from \$1.85 to \$2 per twenty-five pound sack, and the cost of wads and primers was in proportion.

In "flight duck shooting" on the river, it was not unusual to empty the 200 shotgun shells by noon, and to retrieve from 50 to 100 ducks as a morning's shoot from the "tule splitter." The average load for the 4 gauge shotgun was 20 drams of powder and 6 ounces of shot.

In hunting ducks and shore birds on the bay, the flocks were "worked" with and the shooting done from the scull boat.

Three guns were carried in the scull boat, namely; the 12 gauge, 10 gauge, and 4 gauge shot guns. Generally the shooting was done with the 10 gauge, the 4 gauge being reserved for a "big shot" at a large flock of ducks, and the 12 gauge to shoot the crippled ducks.

Frequently shots were made from the scull boat that resulted in a bag of from 50 to 100 birds. My best show with the 10 gauge resulted in a bag of 38 teal, while my best shot with the 4 gauge netted me a bag of 67 mixed ducks. My partner's best shot with a discharge of one barrel of the 4 gauge was a bag of 89 mixed ducks, and a bag of 120 mixed ducks as the result of a discharge of both barrels of the 4 gauge.

"Big shots" at shore birds were generally secured by the use of the scull boat along the bay shore at high tide. The 10 gauge was used to make these shots and a mixed bag, consisting of from 75 to 100 willet, curlew, dowitcher, plover and other shore birds was not unusual as the result of the discharge of both barrels.

During the seventies, eighties and nineties, deer, quail and rabbits were shot and trapped by market hunters in all of the peninsular counties, and in the counties bordering on the San Francisco Bay as well as in other sections of the state.

It is safe to say that during these years thousands of deer and upwards of 200,000 quail and a million ducks, geese, and shore birds, were annually sold in the open markets within the state.

During the seventies and eighties, the principal market hunters in the San Joaquin and Sacramento River sections were Joe Sharp, Hermann Reed, Jim Suttin, the Lambert Brothers, "French Pete" and "Butcher Bill," and in the upper San Francisco Bay region Peter Petersen (Pete, the Hunter), George (Plug) Littlejohn, Charles (Charley Pikin) Petersen, Louis Werder, Charley Kee (Chiney Charley), Tom Redman and Thomas (Coal Oil Tommy) Wilson, were the recognized market hunters.

The first leasing of land for duck shooting purposes that I recall was about 1882 or 1883. During those years Twitchell Island, near Rio Vista, on the Sacramento River, was leased by market hunters for duck shooting purposes and, if I am not mistaken, the leasing of this island by market hunters was the beginning of the establishment of private duck shooting preserves in California, as within the next succeeding few years many private duck shooting preserves were established by various clubs on the Suisun marsh and in various other sections of the state.

During the late seventies and early eighties Hart and Goodwin and George H. Pitts and Company were the principal wholesale and retail dealers in wild game in San Francisco. Hart and Goodwin's place of business was located in the old California Market and that of George H. Pitts and Company at Clay and Sansome streets.

To these markets most of the market hunters consigned their game and paid a commission, usually 10 per cent, for its sale.

The average price received by the market hunters for their ducks during the seventies and eighties ranged from \$2.50 to \$3 per dozen for "cans" (canvas-backs) and mallards; \$1.75 to \$2 per dozen for "sprig" (pintails); \$1.25 to \$1.50 per dozen for small ducks, widgeon (balleys), gadwall (grey duck), shovelers (spoonies), greater and lesser scaup (blue bills), ruddy duck (wire tails and spatters), buffle-head (butter balls), golden eye (brownies and whistlers), and \$1 to \$1.75 for green wing and cinnamon teal.

White geese, brant, "speckled breast" and grey geese ranged from \$1 to \$3.50 per dozen, and Canada geese (honkers), swan and sandhill cranes from \$4 to \$6 per dozen. Bittern, blue and night heron, curlew,

plover, willet, godwit, dowitcher, rail, yellowlegs, sandpipers and other shorebirds from 50 cents to \$1.50 per dozen. Grebe skins and seal skins brought from 75 cents to \$2 each, and seal oil 75 cents per gallon.

Quail, rabbits and squirrels brought the hunters from 75 cents to \$1.50 per dozen and deer meat from 10 cents to 15 cents per pound.

The market hunters sacked their game and shipped it to the markets via river steamers and railroad trains. Upon arrival in the markets, the game was sorted out and the various species placed in piles on the floor of the markets and hung in pairs and bunches on the hooks of the game stalls. Early each morning during the game season great numbers of peddlers, retail game dealers, restaurant and hotel keepers assembled at the markets and bought the game at the lowest price possible for resale. By seven o'clock in the morning the peddlers were offering game for sale by walking through the streets of the city with a back load of ducks and geese crying—"Wild game! Wild game!"

While there was something of adventure, there was not much real excitement in the life of the market duck hunter. It was all in the day's work, and of such nature as to remove all sense of sportsmanship.

Under the unwritten law that prevailed among the market hunters, the shooting began at daylight and was continued until sunset as suited the pleasure of the hunter, the object being to kill as much game and as economically as possible.

In those days, quail and deer were the only birds and animals protected by law, and then only during a short closed season.

As the duck season opened September 1st and closed March 1st, we would begin shooting ducks on the opening date and continue duck hunting until the close of the season, when we would begin hunting shore birds and grebe. This we would continue until about the middle of April, when we would begin to hunt seal for their oil and skins, which found ready sale at the tanneries at Redwood City.

While I did very little quail hunting for market, and have never made a "big shot" at quail myself, I know of instances where as many as 35 or 40 quail were retrieved as the result of the discharge of a 12 gauge shotgun.

About 1885 I gave up market hunting and entered other vocations, but it was not until about 1892 that any real decrease in the supply of waterfowl and other wild life in this state became noticeable, and not until 1900 was any real effort for the enactment of laws for the better protection and conservation of fish and game undertaken. But not until within the past two years was the general apathy that prevailed among sportsmen removed and any united constructive move made by the people and the sportsmen for the protection of fish, game and wild life.

How much better it would have been for the protection and conservation of wild life and the propagation of fish and game as an asset and resource of the state had the people endorsed the idea of wild life conservation and acted fifty years ago, instead of at this late date.

FOOD HABITS OF THE CHINESE PHEASANT.

By AUGUST BADE, Superintendent, State Game Farm.

Ever since the introduction of the Chinese pheasant in the state of Oregon in the early eighties there has been much discussion periodically

as to the food habits of the bird. Many claimed the bird was an economic asset to the farmer while others saw fit to brand him as a destroyer of crops and asked for his scalp. The writer grew up, so to speak, among the birds and had the opportunity of observing them at close range over a period of twenty-five years. In the majority of cases, when all the evidence had been gathered, the bird has been given a clean bill of health and declared a friend and not an enemy to the farmer.

One of the very interesting phases of the question to me is this; as the bird becomes well established in a community and the people come to know him intimately you scarcely ever hear this question of his depredations raised at all. He is admired by many for his alertness and beauty and by others for his helpfulness in the destruction of the



FIG. 39. Incubator run at the State Game Farm, showing 1550 ringneck pheasant eggs.

many insect pests that cost the agricultural man thousands of dollars yearly. When the question is raised, it is usually by someone who is looking for copy or the man who has been shooting out of season and is looking for justification for a guilty conscience.

With the introduction of the pheasant in Washington, some twenty years after the Oregon importation, this question kept coming up until the State Department of Game and Game Fish instituted a thorough investigation. The results of that investigation are now matters of record and may be had by anyone interested enough to ask for them.

Since the bird is purely insectivorous, it would on the face of it and in view of the established facts, seem a little far fetched to accuse him of

eating grains and other crops usually grown by the farmer. It is true that many birds are seen in grain fields and on other lands used by the farmer, but if the trouble were taken to ascertain the facts it would be found in nearly every case that he was there because of the presence of insects where it was far easier for him to get the food that he naturally lives upon.

There is one and only one sure way to get at the facts of the food of any bird or animal, and that is to examine the crops or stomachs of a sufficient number to get a fair average. When this is done the stigma of destruction laid at the door of the pheasant disappears as quickly as the morning fog before the rays of the sun. In one particular case I saw the crop contents of a hen pheasant that had been shot in the center of a thousand acre wheat field that contained not a single kernel of grain



FIG. 40. "Out of prison." This baby pheasant has just freed himself of the shell. Photograph by H. C. Bryant, State Game Farm, May 6, 1927.

but was made up of worms, bugs, mustard seed, and quite a per cent of greens.

It is true that cereals of different kinds are used by many game bird breeders as food but if the grains are not first cooked, the results are sometimes very discouraging. Usually they are used as a substitute food and if insect food or its equivalent is not given as a part of the daily ration of the bird and the results obtained will not justify the trouble and expense incurred. One of the biggest problems of game bird farming has been to find suitable insect food or its equivalent.

During the season of 1923 an incident came to the attention of the writer that will give you some idea of the value of the pheasant to the farmer and the esteem in which he is held. It was at the time when the first birds were being distributed from the game farm at Walla Walla, Washington, and the requests were coming in from all sections

of the country. J. M. Blue, a farmer of the Walla Walla Valley, asked for an allotment of birds for his locality and promised absolute protection even during the open season. His request was granted and the birds were delivered from the farm by truck, a distance of fifteen miles. At his suggestion they were liberated in an alfalfa field near his residence. In a few weeks he phoned to know if he might have more birds. He was informed that there were no more birds available for his section. In a little while the request was repeated. He was again refused. It was at this time that he advised me that he had secured an extra cutting of alfalfa hay because of the presence of the few birds planted on his place. Wire worms had just about taken the neighborhood and many of his fellow farmers had but one crop while he had secured an extra one and was perfectly willing to give credit to the birds. He told me afterwards that no hunting would be allowed on his place at any time.

Another very fine tribute to the pheasant came to the writer unsolicited from Carl Miller of Twin Falls, Idaho. Mr. Miller had moved from the Walla Walla Valley to the Twin Falls section at the time of the opening up of a large irrigation project. He secured some land and evidently prospered, for in a few years he persuaded three or four of his neighbors to go in with him and buy some pheasants for stocking their lands, with the idea of having private sport after a reasonable closed season. The lands of the four or five farmers were posted and the birds planted. They multiplied rapidly under the climatic conditions and the protection given them and it was just about time to declare the long looked for open season. That part of Idaho was hit by a terrific scourge of grasshoppers for no good reason at all and many of the farmers lost heavily and in some cases the destruction was complete. The farmers who had planted the pheasants lost nothing. Mr. Miller gave the birds full credit for saving them thousands of dollars. And they could still have the open season for which they had waited.

Another little incident of a personal nature will not do any harm. John D. Ankeny, son of the late Senator, Levi Ankeny, Walla Walla, Washington, related this incident as his personal observation on one of his farms near the city.*

The foreman of this particular farm complained that he could not raise any corn because the pheasants dug it up as fast as he would plant it. Mr. Ankeny was of that turn of mind that he usually investigated a matter before rendering judgment. For several mornings before taking up his duties at the bank he would drive out to the ranch and spend an hour or so watching the pheasants dig up the young shoots of corn. They were doing that very thing. The complaint of his foreman was justified, apparently. However, he went into the matter a little further and discovered that cut worms were destroying the shoots of corn and the pheasants were after the worms. He concluded that the pheasant knew by the wilting of the corn that a worm was near at hand and he went after him and the digging up of the corn was only incidental to the operation.

*Mr. Blue is a farmer of the Walla Walla Valley, Mr. Miller is a farmer-legislator in Idaho and Mr. Ankeny is president of the First National Bank of Walla Walla and associated with several other banks of the valley and state. They are all representative citizens of their localities. These facts can be easily verified.

RECENT LEGISLATION.

Of the 121 bills relating to fish and game introduced in the 1927 session of the state legislature forty received favorable action. Harmony seemed to prevail and there was little opposition to the major matters. Members of legislative committees gave ear to both sides of each question and on the whole seemed to make fair judgments. For this reason the Governor was willing to sign practically all of the bills passed. As a result a number of constructive laws were enacted.

Three new laws will greatly help in wisely administering the state's wild life resources. First and foremost in Senate Bill No. 610, which amended the hunting and angling license act to provide for an increase to \$2 each for both resident hunting and angling licenses. The law also provides that one-third of all moneys received for hunting licenses must be held in a special fund to be used for the purchase of game refuges and public shooting grounds. This gives hope of improving the duck hunting in the state.

A second law of importance is that which gives the Fish and Game Commission, through the Director of Natural Resources and the Governor, authority to close to angling streams and lakes or portions of streams and lakes that have been stocked with trout. In the past anglers have often cleaned newly planted streams of small fish. Certainly when a stream is planted fish should have a chance to reproduce themselves before being caught. This new law will allow California to follow Oregon's example in closing streams in order that fish may be allowed to grow to the proper size.

The third important measure provides for a special deer tag license costing \$1. Each legally killed deer will hereafter have to bear a tag license. When this has been properly signed by an official authorized to administer an oath, or by a regular deputy of the Fish and Game Commission, the carcass of the legally taken deer may be shipped from an open district into a closed district. Sportsmen have desired such a provision for many years. It will allow a hunter without too much red tape to bring back his buck and use it for food even though killed at a distance from his home town. Furthermore, it will give the Fish and Game Commission a check on the actual number of deer killed each year and will prevent grasping sportsmen from securing more than their allotted number of bucks per season.

A total of about forty measures was actually passed and signed by the Governor. Several of these were slight amendments of the game laws. At least two provided for new refuges. One was necessary to make the open season on ducks and geese conform with that of the federal law. The opening of the trapping season has been changed from October 15 to November 15, thus shortening the season one month. Three fur-bearing mammals, the kit fox, beaver and muskrat, have been added to the list of fur-bearing mammals. According to another bill commercial hunting clubs will be licensed in order to prevent certain abuses. This will not in any way affect the privately owned and operated clubs.

Modification of the laws relating to fish include the prohibition of the use of a spear in taking trout (it is still allowed in the taking of salmon in certain districts). Increase in the size limit of pismo clams to five inches and a limit of thirty per day placed upon razor clams.

The summary of the changes made follows:

SUMMARY OF CHANGES IN FISH AND GAME LAWS.

Legislative Session, 1927.

Senate Bill No. 106—Amends section 627b Penal Code.

Amends the law relative to the shipment of fish by parcel post by allowing the shipment of salt, dried or cured fish other than *trout* by parcel post.

Senate Bill No. 128.

Creates a new game refuge in San Jacinto Mountains, Riverside County.

Senate Bill No. 356—Deer Tag License Act.

Provides that everyone who hunts deer must do so under authority of a deer tag license, costing \$1 for two tags. It provides that the tag license must be tied to the horns of the deer immediately upon killing and the duplicate filled out and mailed immediately to the Fish and Game Commission. It further provides that a deer legally killed in an open district may be transported into a closed district by having the tag license countersigned by an official authorized to administer an oath, or by a regular deputy of the Fish and Game Commission.

Senate Bill No. 462.

This bill provides that live domestically reared trout may be transported from one private hatchery to another under a permit from the Fish and Game Commission, and places restrictions on the placing of domestically reared trout in any of the streams of the state.

Senate Bill No. 463—Amends section 626g Penal Code.

This bill continues the present closed season on tree squirrels.

Senate Bill No. 465—Amends section 626k Penal Code.

This bill prohibits the importation for food purposes of certain species of birds, and adds "partridge-like" birds to the present list of species that are not allowed to be brought in. This is necessary in order to protect our present species.

Senate Bill No. 466.

This bill provides for a five per cent commission on the sale of hunting, angling and other licenses.

Senate Bill No. 535—Amends section 628 Penal Code.

This eliminates the importation of crabs during the closed season for the taking of crabs in this state. It allows the importation and sale of crab meat under regulations.

Senate Bill No. 583—New section 626½ Penal Code.

Removes water fowl, including ducks, geese, mudhens and jacksnipe, from section 626 and provides for an open season from the first of October until the fifteenth of January. This season conforms to the federal law.

Senate Bill No. 605—Amends section 642 Political Code.

Gives the Commissioner the right to employ nonsalaried deputies. Provides for a bond of \$2,500 on such deputies, the premium to be paid out of the fish and game preservation fund. This legalizes the deputizing of Forest Service officers.

Provides that the Commission may carry on scientific investigation for the proper understanding of the conservation laws.

Provides that the Commission may purchase lands for refuge and public shooting grounds.

Senate Bill No. 606.

Authorizes the Commission to take such steps as are necessary to reduce any species of wild life that may unduly prey on another species.

Senate Bill No. 607.

Gives the Commission, through the Director of the Department of Natural Resources and the Governor, authority to close to angling streams and lakes or portions of streams and lakes that have been stocked with trout.

Gives the Director of the Department of Natural Resources, and the Governor, authority to close areas to campers during emergency.

Senate Bill No. 610—Hunting and Angling License Act.

This increases the hunting license fee from \$1 to \$2. Provides that those residents under the age of 18 years can secure a license for hunting for \$1. The fee charged declarant aliens, aliens and nonresidents is not changed.

The angling license is increased from \$1 to \$2. No license required of those under 18. Nonresident licenses the same as at present, \$3. Alien license is increased to \$5.

The hunting license year is changed from the fiscal year to the calendar year, but it provides that the law will not go into effect until January 1, 1928, and that the hunting license issued for the fiscal year July 1, 1927-July 1, 1928, shall be valid until July 1, 1928.

It adds to the list of game fish perch, crappie, calico bass and sunfish.

Provides that one-third of all moneys received from hunting licenses must be held in a special fund, to be used for the purchase of game refuges and public shooting grounds. The areas to be purchased to be passed upon by the advisory committee of seven members who are appointed with the approval of the Governor.

Senate Bill No. 635.

This removes from the commercial fish area certain waters in the vicinity of Stockton and allows striped bass to be taken there by anglers only.

Senate Bill No. 860.

This adds to game refuge 4-B certain lands that are owned by the city of Los Angeles.

Senate Bill No. 725.

This provides for the licensing of commercial hunting clubs, but will not affect in any way privately owned and operated clubs. The intent of this law is to prevent the abuses which are said to have been in practice on some commercial clubs.

Assembly Bill No. 27—Amends section 634 Penal Code.

Provides that salmon may be taken with a spear, or hook and line, in districts 1, 1½, 2, 2½, 3, and in the Klamath River *except* tidewater.

Provides that two salmon per day may be taken in districts 8, 9, 12A, 1, 1½, 2, 2½, 3, and during the closed season for nets in districts 12, 12B, 13, and Klamath River tidewater.

Provides a closed season for the taking of salmon as follows:

District 1, November 1 to May 31;

Districts 1½, 2, 2½, 3, and the Klamath River, October 6 to May 31;

Districts 10 and 11, August 16 to April 30;

Districts 15, 16, 17 and 18, August 16 to March 31.

Assembly Bill No. 199—Amends section 637c Penal Code.

Provides for the protection of California sea lions only in districts 19, 20 and 20A; removes protection from them in all other sections.

Assembly Bill No. 244—New section 626da Penal Code.

This removes all protection from cottontail and brush rabbits in district 4¾.

Assembly Bill No. 448.

Provides an amendment to the law governing the installation of fish screens.

If a screen has once been installed in accordance with the plans and specifications of the Commission, and thereafter it is necessary to install a screen of new design, then such second installation must be paid for by the Fish and Game Commission, but cost of maintenance must be borne by the owner of the land on which such screen is installed.

Assembly Bill No. 601—New section 628k Penal Code.

Provides for a closed season on grunion during the months of April, May and June.

Assembly Bill No. 649.

Gives protection to pheasants all over the state, by closing the one open section now existing in District 4¾ in southern California.

Assembly Bill No. 650—Amends section 632 Penal Code.

Provides that *trout* may only be taken by rod and line, the rod to be held in the hand. Spearing is absolutely prohibited.

Provides open season on all trout except *golden trout* as follows:

All districts *except* 2½, 4½, 23, 24, 25, May 1 to October 31.

District 2½, May 30 to February 14.

Districts 4½, 23, 24 and 25, May 30 to October 31.

In tidewater and in districts 2, 3 and 15, and in Napa and Russian rivers, May 1 to February 28.

In addition to the summer open season, in districts 1½ and Klamath River, provides for a winter season during November and December.

In Lake Almanor the season will be May 1 to October 31.

In the Truckee River the season will be from May 15 to October 31.

The limit will be the same as at present throughout the state, with the exception that in tidewater in districts 2, 3, 15, and in the Russian and Napa rivers from November 1 to the last of February, the limit is three fish per day regardless of size.

The open season on *golden trout* is the same as at present, July, August and September.

Not more than two attractor blades and three hooks on any line.

District 1¾ includes Modoc and Lassen counties.

District 1½ includes Siskiyou, Humboldt and Del Norte counties.

District 1 includes the Sierras from Siskiyou County down to Kern County.

Districts 2 and 3 include the coast counties.

District 4½ includes Inyo and Mono counties.

District 4¾ includes San Diego and Imperial counties.

District 4 includes the other counties south of the Tehachapi mountains.

Assembly Bill No. 653—Amends section 626i Penal Code.

This provides for a one-deer bag limit in district 1¾, Modoc and Lassen counties, but provides that a resident of that district may kill an additional deer in another district and transport it to his residence when he has complied with the other provisions of the law. The bag limit in all other parts of the state is left as at present.

Assembly Bill No. 660—Amends section 628f Penal Code.

The size limit for Pismo clams is increased from 4¾ to 5 inches. A limit of thirty per day is placed on razor clams and it is made unlawful to ship or offer for shipment any Pismo clams.

Assembly Bill No. 803.

This bill changes slightly the boundaries of some of the game refuges and adds a new refuge.

It adds new districts 1N, 1O, 1P, 1Q, 3G. These districts are set aside by Assembly Bill No. 805 as game refuges.

It changes the boundaries of district 12, a commercial fishing district of the Bay region. Prohibits the commercial fishing of striped bass in that portion of San Francisco Bay lying west of a line drawn from California Point to San Quentin Point, and from San Quentin Point to San Pedro Point; that portion of San Pablo Bay lying west of a line drawn from San Pedro Point to the south bank of Novato Creek, and that portion of San Pablo Bay lying north of a line drawn from the south bank of Novato Creek due easterly to Mare Island.

It removes all of Gualala River from district 2½.

Assembly Bill No. 807—Amends Fur Trapping Regulations.

Postpones the opening of the trapping season from October 15 to November 15, thus shortening the trapping season one month.

Adds kit fox, beaver and muskrat to the list of fur-bearing mammals.

Removes protection from bears in districts 1, 1½, 2 and 2½ until July 1, 1930.

Assembly Bill No. 867—Amends section 628b Penal Code.

Reduces general bag limit on black bass from 25 to 15 per day; increases minimum size limit from seven to nine inches.

Assembly Bill No. 998—Amends section 626f Penal Code.

This bill provides that in the Sierra region in districts 1, 1¾, 4, 4½, 4¾, 23, 24, 25 and 26, the open season for the taking of deer shall be from the 16th of September until the 15th of October. The season is thus shortened two weeks owing to fire hazard. The deer season of the other parts of the state is not changed.

Assembly Bill No. 1201—Amends section 626o Penal Code.

Prohibits the hunting of ducks from scull boats in district 12, San Pablo Bay, and in that part of Napa River south of Edgerly Island

CALIFORNIA FISH AND GAME.

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August 18, 1927.

Fishing and hunting constitutes the best of antidotes for the nerve wear of civilization.

INCREASED LICENSE FEES PROVIDE FOR ENLARGED PROGRAM.

We record with pleasure the fact that the legislature has adopted, and the Governor has signed, the bill increasing our angling and hunting licenses to \$2 each per annum. This measure finally puts California on a par with many of its sister states and allows us to enter upon an enlarged program to restore fishing and hunting in our state.

The law does not go into effect until January 1, 1928, but during the fiscal year commencing July 1, 1927, we will have a portion of the increased revenue which accrues during next spring; consequently we can immediately start our program in a limited way.

The Commission has laid out an extensive four-year program, providing for new permanent equipment on hatcheries, game farm, refuges and public shooting grounds. In fact, the new bill provides that one-third of all hunting revenue for a period of five years must be used in the purchase of game refuges and public shooting grounds.

During this first year the Commission contemplates the construction of four new hatcheries, a new game farm in southern California, the employment of thirty new full-time deputies, enlargement of our educational work by the employment of additional lecturers and assistants, a more extensive research into all fish and game problems and a program which calls for the actual planting of all fish by our own trained employees.

The entire program as outlined will continue to stress the aim of the Commission since its reorganization, which is to place conservation in California upon a strictly business basis.

EAR MARKS OF PROGRESS.

Everyone interested in fish and game has noted the splendid results attending the reorganization of the Fish and Game Commission instituted two years ago. The corps of law enforcement officers now working directly under one head and supervised by captains comprise now a unified and efficient body. A neat uniform worn on proper occasion has given the men a certain pride in themselves and has helped to gain the confidence of the public. There is continual endeavor to increase efficiency everywhere. Recently additions have been made to the notebook carried by each game warden: a map showing the location and the number of birds concerned in the sixteen pheasant plants made from the game farm last year; another map locates all of the eighteen hatcheries and twenty egg-collecting stations operated by the fish cultural department; a third map indicates the number of mountain lions killed in each county of the state in 1925, together with the total number killed in each county since the bounty on lions was first offered in 1907.

COMMISSION GIVEN POWER TO CLOSE STREAMS TO FISHING.

The Fish and Game Commission plants millions of fish in lakes and streams each fall. A few months later the trout season opens and anglers catch the same fish grown only an inch or two longer, and before they have grown old enough to propagate themselves. The legislature has made all regulations concerning protection and it meets but once every two years. For some time it has been apparent that the one satisfactory way of handling this situation was to have the legislature grant plenary powers to the Fish and Game Commission.

A new act (Senate Bill No. 607) entitled "An act to authorize and empower the Director of Natural Resources to close to fishing and camping any area in any state park or forestry area or fish and game district" is now a law. It reads as follows:

SECTION 1. For the purpose of further protecting trout with which the fish and game commission has stocked the various waters of this state, the director of natural resources, with the consent of the governor, is hereby authorized and empowered, upon recommendation of the fish and game commission, to close to trout fishing any stream or lake of this state, or designated portion thereof, for such time as such director may designate, or until such time as new legislation thereon enacted by the state legislature may become effective.

SEC. 2. The director of natural resources, with the consent of the governor, shall have power to declare closed to camping any area in any state park or forestry area when, in the judgment of the director, such declaration is necessary in the interest of public peace or safety, and the director of natural resources shall have power and is vested with the duty of enforcing such order against camping.

SEC. 3. During the period when any open season is suspended or closed by the director of natural resources, all provisions of law relating to the

closed season for such fishes shall be enforced; and each person who violates such provisions shall be subject to the penalties prescribed therefor.

Sec. 4. Any order issued under this act shall be published twice in at least one newspaper of general circulation in any county affected by such order and such publication shall be separated by a period of not less than one week and not more than two weeks and such order shall be posted in such public places in each county as the director of natural resources may direct.

deavor and, second, in knowledge. It really appears that sentiment is favoring more activity looking to the preservation of wild life resources, but how can this activity be guided in the correct projects without proper knowledge. Of first importance is the gathering together of knowledge secured by others of the life history and habits of game



FIG. 41. With evidence present in court that he had been trapping quail, Tokukino was arrested by Deputies Post and Newsome near Salinas. He was fined \$125 and given six months suspended jail sentence, March 10, 1927, for killing quail in closed season and hunting without a license.

Although discretionary powers are very limited, a means of improving fishing, such as Oregon has had, is now available. This new law should greatly help in improving angling conditions.

EXPERIENCE BEST TEACHER.

The solution of the many problems relating to game conservation lies first, in en-

and then taking it one step farther and securing all that the present day can furnish. In this accumulation of scientific data lies the foundation of worthwhile conservation projects. Too little scientific research is being undertaken to properly assure worthwhile results in conservation undertakings.

HAVE YOU A DEER TAG LICENSE?

Under the provisions of the new law which is now effective, it is necessary for every person who hunts deer to have a Duplicate Deer Tag License in addition to the regular hunting license. The cost of the Deer Tag License is \$1.00 for two tags, in duplicate, which may be obtained from the Fish and Game Commission, any County Clerk or license agent.

The Deer Tag Licenses are duplicate in form, and must be carried by the licensee at all times while hunting deer. When a deer is killed, a tag must be filled out and the original attached to the horns of the deer and the duplicate mailed immediately to the Fish and Game Commission.

A further provision of the new law is that a deer, lawfully killed in an open district, may be transported into a closed district by having the tag license countersigned by an officer authorized to administer oaths, or by a regular deputy of the Fish and Game Commission.

If fully complied with, this measure makes it possible to secure an accurate tabulation of deer killed in the state. This information is essential as a basis for conservation legislation. Without laying stress on the fact that failure to do so is a misdemeanor, every deer hunter is asked to furnish all of the information required concerning deer killed by him.

THE NEW DEPARTMENT OF NATURAL RESOURCES.

Every big business operates under a system of departments and subdepartments, with elimination, as far as possible, of all duplication of effort. The State of California spends more money and has more work to do than the average corporation, yet heretofore there has been much duplication of effort and altogether too many separate and distinct departments for the business of government to function efficiently. A few years ago an experiment was tried on combining a number of state commissions under one head, the director of agriculture. Everyone agrees that this was a good move and that these various duties of the state have been more effectively carried out. The present state administration has rightly planned further coordination of departments which will result in the creation of a governor's cabinet made up of the directors of various main departments. Several commissions having to do with natural resources and their conservation have been coordinated and henceforth will function as divisions of a

Department of Natural Resources. This department, under the direction of an appointee of the Governor who will sit in the Governor's cabinet, will include the Fish and Game Commission, the Department of Forestry, the State Mining Bureau, Department of Petroleum and Gas, and the Department of State Parks, which has just been established.

No actual change in the organization or functioning of the Fish and Game Commission is contemplated. A commission of three men will continue to administer conservation activities and this Commission will continue to be a self-supporting body and all fish and game funds will be utilized in fish and game conservation.

The benefits accruing from this reorganization are two in number.

1. Direct approach to the Governor and other departments of the state through the director of the Department of Natural Resources.
2. The harmonizing and coordinating of the work of the various conservation departments of the state.

DESERTED FAWNS.

The breeding grounds of deer, in spite of the fact that they are often included within the game refuges, do not furnish complete protection. Nowadays, the fawning grounds are overrun with summer vacationists, nor do all of these summer vacationists respect the rights of game. All too often a fawn is stolen from its mother. The time-honored explanation is that "the poor little thing was found starved and deserted by its mother." Those who know the habits of deer, know that such an explanation is not a satisfactory one. The real explanation shows inhumane treatment. Deer do not desert their fawns and those that are carried home to be fed on a bottle are really stolen from the mother that is watching from behind a near-by tree. The average person finds the job of feeding a baby deer too exacting with the result that most die. If the fawn is reared to maturity, application is soon made to the Fish and Game Commission for its removal because of the danger and difficulty of handling a mature deer. It has long been the policy of the Fish and Game Commission to look with disfavor upon the many who write in for permits to hold a "poor, little, starved fawn found deserted by its mother."

DO YOU KNOW YOUR GAME WARDEN?

As was explained in a previous number of CALIFORNIA FISH AND GAME the patrol has been reorganized and captains have been placed in charge of the men in various districts. The list of deputies appears on the back cover of this number. By reference to it, anyone can cooperate with the Com-

mission by reporting to the deputy of the district in which he may be hunting or fishing any flagrant violation of the fish and game laws. These men are listed with this end in view. The deputy is there to help conserve game. One would not hesitate to report a burglar, and people should feel the same about reporting fish and game law violations. The warden needs your cooperation.

FISH DISTRIBUTION.

By June 1st. plans were practically complete for the start of the 1927 planting of trout under the new program adopted for this year's work by the Fish and Game Commission.

Patrol Captain Oliver P. Brownlow, having been placed in charge of the fish planting program, completed a survey of the conditions throughout the state and began supervising the distribution of young trout as soon as they were ready to leave the hatchery.

Patrol captains throughout the state were interviewed and data from various sources collected. Deputies have made comprehensive reports on the need for fish in various sections this year. In practically all districts it has been found that sportsmen and the various organizations that have been planting fish in years past are enthusiastic regarding the new plan that provides for the supervision of the plant by patrol captains and their deputies.

Under the new plan the applications for fish are made by the captains of patrol and the fry is consigned to the captain or deputy in sections where there is no captain. As a result, the authorized officers of the Fish and Game Commission take active charge of the planting and responsibility can be fixed for the placing of the fish in the proper places.

Much barren water will be planted this year, in addition to the stocking of trout streams and waters that have already been established as good fishing grounds and care will be taken that none are wasted in streams that dry up. The hatchery output is to go into those streams and lakes where they are needed and not to individuals who wish to stock their favorite fishing grounds.

Before this new system can be made to function properly a biological survey of lakes and streams is badly needed. Several eastern states have undertaken such surveys and California should not delay similar work. Plans in this direction are being formulated.

NATURAL HISTORY INSTRUCTION IN THE SCHOOLS.

For many years a state law provided that nature study should be taught in every public school. In spite of the law there were few places where the subject was adequately handled. When school superintendents were put the question, "why are you not doing

more with nature study?" two answers were forthcoming: first, "the curriculum is already so full that we have had to eliminate some subjects;" second, "we are unprepared to teach nature study and we have not had sufficient time to secure the necessary training." As a result of the first complaint, the 1925 legislature revised the school law and eliminated therefrom the requirement that nature study be taught. There are now twelve subjects prescribed by law with three electives. These prescribed subjects do not include nature study nor elementary science, although humane education is included. In those counties where the Board of Education is sufficiently interested in nature study, it is designated as one of the electives.

It may be that this subject will really gain by not being required, for sometimes the things that are forced are least effective. Certainly if the matter is handled wisely, we can still expect to accomplish much in the public schools. At present plans are being laid for the furnishing of such attractive material that teachers will want to make use of it. In this lies perhaps the best solution to the problem of teaching conservation in the public schools.

THE DUCK FUND.

The attempt to raise a certain quota to finance a survey of Lower Klamath Lake in order to determine how the problem of restoration of this one-time game refuge can be solved has been successful in California. The Associated Sportsmen placed subscription lists in various sporting goods stores and collected a portion of the sum and the owners of duck clubs made up the remainder. This has been sent to the chief of the Biological Survey for use in determining the cost and the best means to be taken to restore the famous breeding ground for wildfowl. After this survey has been made, it will be possible to determine the next move.

PLANS FOR INCREASING THE DUCK SUPPLY.

Three years of poor duck shooting in California has started sportsmen to seek a way of replenishing the supply of ducks. That similar conditions have existed elsewhere was indicated by recommendations by the Advisory Board, Migratory Bird Treaty Act, at their meeting held December 9, 1926. A resolution was passed proposing a reduction of the daily bag limit on ducks from twenty-five to fifteen in all states or parts of states, and a reduction from eight to six on the daily bag limit of geese to be effective throughout the country.

This proceeding resulted in such a large number of protests being sent to the Secretary of Agriculture, that a public hearing was ordered held at Washington on January 20, 1927. About ninety people were in

attendance. The discussion brought out that reduction in bag limit is an exceedingly ineffective and unsatisfactory method in actually reducing the kill of birds due to the fact that it is practically an impossibility actually to control the number of birds each hunter kills in view of the very limited number of available wardens. Discussion then centered upon the shortening of the open season as a means of reducing the annual kill. This proposal of a shortened season met with an equally vigorous protest.

Because of pending legislation it was important that the controversy should be promptly settled. After an exchange of telegrams relative to a proposed change in the season of ducks in the area east of the

The increase license bill, proposed at the last legislature, carried a provision that a share of the increased income should be immediately put into the purchase or rental of suitable wildfowl refuges. The best informed conservationists stand behind the proposition that it is far better to furnish attractive feeding places for wildfowl than to reduce the kill.

It is quite apparent here in California that the continual draining of marshes has left little suitable feeding grounds for ducks and that most of them upon their arrival in the fall travel southward to Mexico where they find conditions more natural. Some of these ducks might well be enticed to stay in Cali-



FIG. 42. Bird banding operations at Lake Merritt, winter 1926. The numerous ducks which had been banded during operation at California's first game refuge have resulted in a number of interesting returns the past winter. Photograph by W. W. Richards.

Sierra Nevada, where it was shown that the boundaries of a proposed district were unsatisfactory, the matter ended by the passage of a bill in the legislature setting the opening of the season again on October 1st and its close on January 15th. This return to an earlier opening date appears to be the most satisfactory solution.

Sportsmen everywhere are trying to improve the situation. In many states, laws providing for the reduction in the bag limit are pending and in a number of states, a definite plan has been worked out for the creation of numerous wildfowl refuges.

fornia and thus augment the supply, nor need there be fear that such a proceeding would necessarily reduce the breeding stock.

It will take a number of years to satisfactorily handle the problem presented. Increased precipitation in the past winter will furnish additional breeding grounds in many parts of the states and the crop of local ducks will certainly be much larger next year. Then if man helps this situation and furnishes still more available feeding grounds, a betterment of conditions can certainly be prophesied.

QUAIL RECEIVE ADDED PROTECTION.

Owing to the fact the pheasants from the game farm are only furnished to those localities that post an area and give the planted birds careful protection, a splendid series of local game refuges are thus being established. As a consequence, better protection is afforded native game as well as introduced game. Several reports are to the effect that quail have increased in these posted areas. This is exactly what should be expected when signs warn the poacher and near-by residents enforce the special regulations.

GAME FARM A BUSY PLACE.

To hear that pheasant eggs were secured nineteen days ahead of last year and that the first settings were made two weeks ahead of last season will be of interest to California sportsmen who have been watching the development of California's new game bird farm at Yountville in the Napa Valley. The first young birds hatched this year on April 12. Last season this farm, just established at that time, produced nearly 3000 pheasants for liberation. This season Superintendent Bade believes he will be able to produce 12,000 birds.

Investigation of last year's plantings has shown that birds have ranged as far as eight miles from the point of liberation. All plants are reported in good condition. Every neighborhood which received birds last season is asking for more this year.

Earlier in the spring most of the planting and cultivation of pens was completed, and a fine growth of plants was ready to furnish cover and feed for the birds when hatched.

The small breeding pens used last year for the pheasants have been transformed for use in the raising of California valley and mountain quail. Last year's experiments with these quail were a success and with another successful season there will be a supply of quail for liberation from the farm this fall.

GAME CENSUSES.

On the back of every angler's license this year is printed a blank form, together with the following statement: "The holder of this license is requested to report to the Fish and Game Commission at San Francisco, on the form below, their yearly catch of fish to be used for statistical records."

This constitutes the third real effort of the Fish and Game Commission to secure suitable statistics as to the actual take of fish and game in the state. For several years the annual kill of deer was compiled from records furnished by deputies and by the forest service. The Commercial Fisheries for several years has been gathering accurate statistics relative to the catch of edible fish. The work of this department constitutes the finest system of collecting statistics yet

devised. With the appearance of the blank on the back of the angler's license we see another effort being made to gauge the take in order to determine what breeding stock is necessary to furnish a dependable annual crop.

The fourth effort along the same line is evidenced in the deer license law recently enacted by the state legislature. Under a tag system it will be possible to determine the exact number of deer killed each year.

The next step after securing statistics relative to the crop will be the securing of actual knowledge relative to the normal death rate and normal fluctuations. With proper knowledge of this sort at hand, the administration of fish and game can be placed upon a real scientific basis, with the possibility of foretelling the crop from year to year as is so splendidly done by agricultural interests with our crops.

With knowledge as to the actual need of statistics of this kind, the angler and hunter should need no urging to make statistics as complete and dependable as is humanly possible.

WILD QUESTIONS.

(Questions on the Wild.)

1. I have two mountain lions in captivity. Can I kill them and collect the bounty?
2. May I have a permit to trap some quail to keep in my aviary?
3. Is it necessary for one to have a separate fishing license if one fishes from a motor boat?
4. What fish is of most value commercially in California.
5. What native California game bird is known locally as the "native pheasant"?
6. Do I need an angling license to catch catfish?
7. Are trout migratory?
8. Does a trout die if removed from the hook and returned to the stream?
9. May I fence off a stream and use it as a private fishing ground?
10. What famous game bird of California has never been taken on the western slope of the Sierra?
11. What is the scientific name of the cinnamon bear?

(See answers on page 202.)

PHEASANT PLANTINGS.

All those interested in propagation and planting of pheasants in California can feel assured that the new game farm at Yountville is making a splendid record. With but a small breeding stock and a very late start, the output for the first year amounted to nearly 3500 birds. This has furnished a splendid breeding stock of young birds for

use this year and at the same time furnished thousands of pheasants for planting in suitable localities. Distribution has been made entirely on the basis of location. Each location has been gone over by an expert and in each instance the surrounding area has been posted and set aside as a refuge. The following map shows clearly where plants have been made and the amounts of each planting.

ing five, the other eleven. In some instances birds have moved five or six miles from their point of hibernation.

Near Redding, where pheasants were planted on August 11, 1926, a number of nests were found during April. At least four hens nested in an alfalfa field. There is much danger of disturbing the nests of pheasants in alfalfa fields, so farmers have been warned

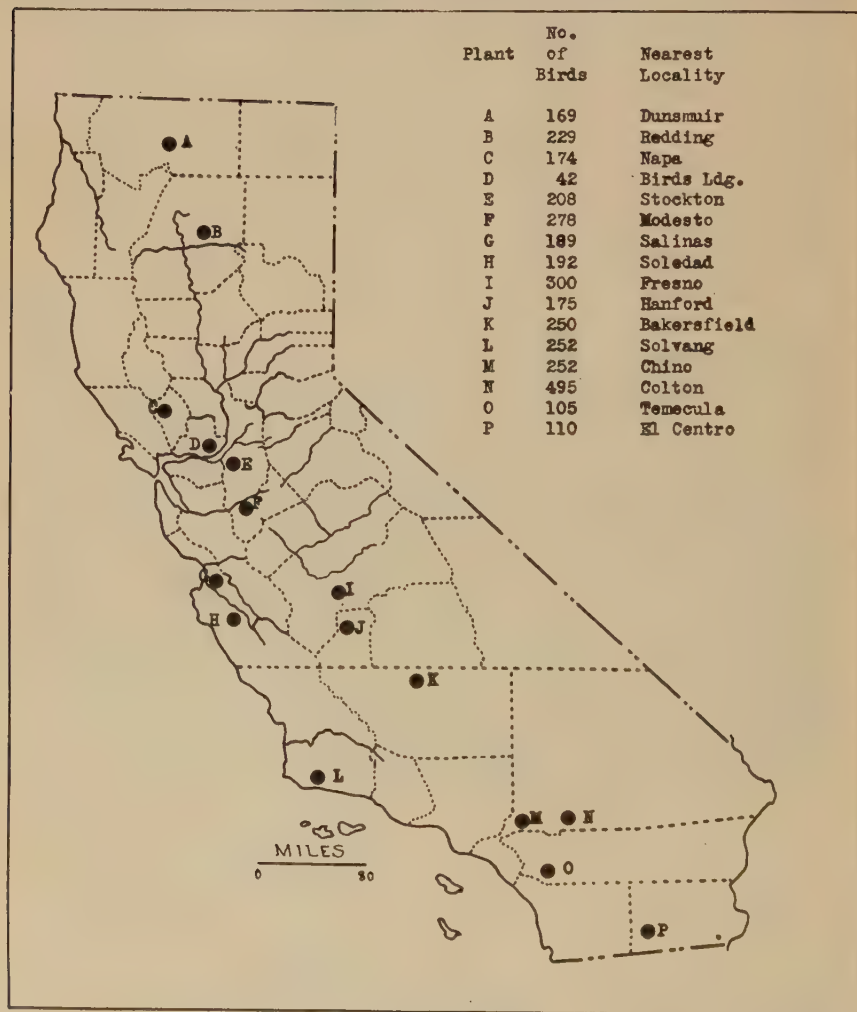


FIG. 43. Map showing Pheasant Plantings in California, 1926-27.

It will be the policy to stock these same places next year rather than attempt new plantings.

Reports show that the plants indicated on the map above have been successful. Those planted on some 3300 acres near Salinas began nesting the last of March. By April 15, two hens were seen with young, one hav-

and all promised to be the guardians of these birds rather than destroyers of them.

SPORT FOR THE ANGLER IN SAN FRANCISCO BAY.

Although piers jutting into San Francisco Bay may not be so conspicuously lined with fishermen as those off the coast of southern

California, yet there are many who find splendid sport in catching the numerous varieties of fish which inhabit the bay. W. I. Follett, an enthusiastic fisherman, has been interested in identifying the various species available in the bay. A hastily computed list shows more than thirty varieties and if the several species of surf fish and rock fish are added, together with some species considered less desirable, the number probably mounts to fifty.

Mr. Follett has promised to furnish readers of CALIFORNIA FISH AND GAME with an illustrated article dealing with various fishes which furnish sport to the San Francisco Bay fishermen.

DEPREDACTIONS OF BIRDS IN FRUIT ORCHARDS.

Although a certain amount of control is practised by orchardists in the San Joaquin Valley each year, a critical situation appeared this past spring which is worthy of attention.

The following resolution passed by the Exeter Chamber of Commerce first stirred bird lovers to action:

WHEREAS, Reports show that certain birds are causing much damage to apricot, almond, plum and peach growers throughout the valley by destroying the fruit buds and by destroying the fruit of these trees, and of grapes, figs, truck crops, vegetable and flower gardens and destroying our best song birds; be it

Resolved, That we, The Exeter Chamber of Commerce, do hereby urge the cooperation of other clubs, schools, boy scouts, farm bureaus, women's clubs and all organizations and individuals to destroy the following birds, which are declared to be depredators, their eggs and nests: Linnets, or House Finch, English, White Crested and Golden Crested Sparrows and Waxwing, and to protect the Owls, slow moving Hawks, Jay and Butcher Birds, which destroy these depredators; and the following birds which do no injury but appeal to the esthetic sense through their songs and beautiful plumage: Blue Bird, Humming Bird, Phoebe, Chickadee, Wren, Oriole and all Warblers. Therefore, be it further

Resolved, That a copy of this resolution be sent to all chambers of commerce, farm bureaus, schools, boy scout organizations, women's clubs and newspapers of Tulare County.

THE EXETER CHAMBER OF COMMERCE

(Signed) O. W. Carr, President.

(Signed) Virginia Van Osdoll, Secretary.

Unfortunately, by the time this resolution reached the newspapers, one word had been left out making it appear that many protected birds were to be warred against by orchardists in Tulare County.

Even after all danger of destruction of fruit buds by the birds was past a farm bureau contest committee of the Exeter district offered five prizes totaling \$75 to the boys or girls who would collect the greatest number of eggs of "linnets and sparrows," the adult bird head to be counted as four eggs and the young bird as two eggs.

Newspapers contained such statements as the following:

"The injury is not spasmodic, it is continuous; it is not assumed, it is actual. One

Strathmore grower reports \$30,000 loss. Another declares his tragedy plums are a total loss. The damage is in apricots, plums, peaches, almonds, grapes and is now hitting the prunes. The damage is greatly on the increase and reports indicate that three-fourths of the deciduous crop of the Terra Bella district has been eaten out by birds.

"One woman writes that last year she picked 16 tons of prunes from a small acreage and that by actual count this year she had 15 blooms on the whole orchard—the buds eaten by birds.

"Sentimentalists must give way. We are told the birds are not to blame, that blight has struck the trees. Blight does not attack plums and yet entire orchards of plums have not a single fruit bud on the trees. The condition is throughout the whole state, not in Tulare County alone. It is most serious.

"We believe we humans are the fittest and should survive. We must protect our crops if we are to survive. Our livelihood and existence depends upon pest control.

"We are told birds control the insect pests. They do not. Birds are more inclined to carry insect pests from one section to another. They carry noxious weed seed all over the country, such as mistletoe, larkspur, morning glory and Johnson grass. Real insect pest control is done by other insects."—*Visalia Delta*, March 23, 1927.

Another interesting feature of the campaign was that statements defending the bluejay and other so-called predatory birds were as follows: "Duck clubs offer a premium to the club that will destroy the greatest number of jay and butcher birds. These have a real and economic value to the farmer as they destroy many destructive birds and their eggs." Thus was put forth a new version of the predatory bird controversy.

One rancher in the district finding destruction of the birds by shooting and poisoning very difficult, worked out a unique method of frightening the birds from his trees. Placing a tall tower in the center of the orchard, he stretched long wires in every direction. On these wires were hung gallon cans filled with rocks. By pulling these wires in the tower, sufficient noise and motion was made even at the far corners of the orchard to frighten the birds away.

Not only did letters pour into the horticultural commissioner's office relative to damage done by birds, but also bird students drew attention to the danger of destroying insect-eating birds and of soliciting the aid of boy scouts in the destruction of birds given protection by state law.

Here, then, is the stirring up of an old controversy. Orchardists maintain that birds are causing thousands of dollars of loss. Bird students, who are supposed to have examined the stomachs of birds to find out exactly what they eat, defending them,



FIG. 44. A rancher in attempting to frighten bud cutting birds from his orchard erected this tower in the center and stretched wires to the far corners of the orchard. On the wires were hung gallon cans filled with rock and sand. A part of the wire trap is the one and drops at the side. Photograph by H. C. Bryant, April, 1927

maintain that it is dangerous to disturb the balance.

A survey of the situation leads us to the following conclusions:

1. Local damage to buds on fruit trees due to the depredations of birds was apparent.

2. The campaign in Tulare County was handled in an unfortunate manner because

a. Boy scouts were asked to destroy birds protected by law.

b. Farmers were urged to use poison in the destruction of birds which is a violation of state law.

c. The original resolution by the Exeter Chamber of Commerce was worded in such a way that it was misconstrued by newspapers and by all who read the resolution.

d. A contest stimulating the destruction of the eggs of "linnets and sparrows" led to the destruction of the eggs of valuable sparrows in addition to destructive ones and was a blow to the years of endeavor to teach children to protect birds rather than to destroy them.

3. There was little effort made to determine the exact stomach contents of the birds destroyed, and consequently no progress was made in knowledge as to whether the birds were being killed on circumstantial evidence or as a result of real knowledge of their food habits. One orchardist presented as evidence, five different species of birds—western robin, gambel sparrow, California towhee, Sierra junco and linnet. When the stomachs of these birds were examined by one accustomed to analyzing the food of birds, no evidence was secured of buds having been taken. The stomachs contained small grain, seeds, herbage and some dried grapes.

The following splendid saying by Herbert Spencer might well be pondered by adherents to both sides of the controversy: "There is a principle which is a bar against all information, which is proof against all argument and which can not fail to keep a man in everlasting ignorance. This principle is *contempt prior to examination*. When cause for a similar controversy arises, we hope there will be fewer accusations and greater endeavor to solve a real problem by getting at the truth by way of scientific research.—H. C. Bryant.

MILLIONS OF HUNTERS.

More than 5,150,000 hunting licenses were taken out during the season of 1925-26 by sportsmen throughout the United States, including Alaska, and the returns to state treasuries amounted to more than \$6,800,000. Although data are lacking from several states, detailed figures for the season, compiled by the Biological Survey of the United

States Department of Agriculture, show increases in the numbers of licenses issued and fees received over the two years preceding. In the 1923-24 season the licenses numbered 4,395,038 and the fees paid were \$5,594,982. One year later 4,904,740 hunters paid for their licenses a total of \$6,190,863.94. During the 1925-26 season the license figures were 5,168,353 and the fees paid totaled \$6,872,812.59. Pennsylvania, with 525,045 licenses and fees of \$646,467.25, headed the list both in licenses and returns to the State treasury.—*The American Field*, April 16, 1927.

MIXING FAUNAS.

Current literature contains the lament of many zoologists to the effect that plant and animal life is becoming so badly mixed up, owing to introduction of exotic species, that the scientist of the future will have difficulty in recognizing what is native and what is not. An article by Dr. L. R. Dice (*Journ. Mamm.*, Vol. 8, No. 2, pp. 90-96, 1927) entitled "The Transfer of Game and Fur-bearing Mammals from State to State, with Special Reference to the Cottontail Rabbit," calls attention to the large number of eastern states that have introduced rabbits from Kansas. During the years 1924-25, the Board of Game Commissioners of Pennsylvania purchased in Kansas and Missouri, and liberated within that state, 58,404 rabbits. There follows a discussion of the danger of hybridization and the danger of the introduction of disease. Dr. Dice's closing paragraph is as follows:

"There are undoubtedly occasions where the restocking of a state from foreign sources is desirable, but in the case of the cottontail rabbit, and probably for most other species, the introduction of foreign stock is unnecessary; it is undesirable from the standpoint of science and of the preservation of uncontaminated wild life; it may introduce contagious diseases; and it probably will cause the hybridization of diverse subspecies, leading to the production of mongrel offspring. I would therefore recommend caution, and before introducing mammals from other states I would advise a thorough study of the probable results by competent experts. Finally I would urge, if introductions are made, that complete records be kept of the subspecies brought in, of the source of origin, and the number of individuals introduced, and of the places of liberation."

DIRECTORY OF BIRD-LIFE OF THE SAN FRANCISCO BAY REGION.

Interest in bird study has been rapidly increasing in California. Many applications come to the state university for an outline of a reading course on birds. What really constitutes such a reading course has just

been issued under the title, *"Directory to the Bird-Life of the San Francisco Bay Region."

The authors are Joseph Grinnell of the University of California, Museum of Vertebrate Zoology, and Margaret W. Wythe, assistant in the same institution. In the preface the authors state that the purpose of the contribution is to provide help and incentive toward the increased knowledge of the bird life in the San Francisco bay region. In addition to furnishing a list of the birds of this area it brings together facts and citations useful to the student. Of particular value is the index feature of the paper, citations being listed under various locality headings. The preface closes by deploring the meager recorded knowledge relative to the life history of even the commonest birds and the hope that the field observations listed in the book would stir others to like activity.

The introductory pages deal with a description of the territory involved, the nine counties surrounding San Francisco Bay, and with available books.

In the main part of the volume is given a general directory including all the species and subspecies of birds known to have occurred anywhere within the area. Only such records as have been published or were available at the university museum have been mentioned. Each species is treated in a uniform system which includes: Common or vernacular name, scientific name, definition of seasonal status, relative abundance, geographic occurrence, places where there is a fair prospect of finding the bird in question, the local habitat preferences and references to published literature.

The summary shows that 383 different varieties of birds (species and subspecies) have been found in these nine counties. Of this number, 121 are permanent residents, 44 summer residents, 131 as winter visitants, 38 as regular transients, 24 as vagrants, 20 as an accidental occurrence, 3 as extinct and 2 as non-native.

The book ends with the following constructive words: "On the whole, it looks as though the total number of species in the Bay region at the present time were undergoing decided reduction, due in major part to the elimination of habitats of wide diversity or of productive kinds. There is little doubt, too, that the aggregate number of individual birds, of all species together, is also becoming less, due to the expansion of closely built-up urban areas where practically no undomesticated bird life of any sort can exist.

"Even though such changes in the direction of diminution are in large part inevitable, they can and should be compensated for in so far as is practicable by the establishment of parks and natural preserves here and there, such as Muir Woods, and by the spread of popular appreciation of bird life as a community asset, so that general protection and encouragement of this asset for its esthetic and other values will become second nature throughout our citizenry."—H. C. B.

ANSWERS TO QUESTIONS ON PAGE 197.

1. Yes! Provided an affidavit signed by three witnesses is furnished, proving that the lions were taken in the State of California.

2. No! Domestically raised quail are better as aviary birds, and are procurable from game breeders.

3. No! Unless you are a commercial fisherman, fishing for profit. Only one license, an angling license, which will cost \$2 beginning January 1, 1928, is necessary for those who fish for pleasure.

4. The sardine is the basis of California's greatest fishery. Fishermen alone collect more than a million and a half dollars for the sardine catch.

5. The Oregon ruffed grouse, found in eastern Siskiyou, Humboldt and Trinity counties.

6. No! The catfish is not named as a game fish in the fish and game laws of California.

7. Some trout are migratory. The steelhead trout spends part of each year in the ocean, but lays its eggs in fresh water. Experiment has shown that trout in the Pit River are non-migratory.

8. Experiment has shown that most trout will survive after being caught, if not too deeply hooked.

9. No! Unless the stream is barren of fish life. State planted fish can not be appropriated for a preserve.

10. The sage hen or sage grouse, the largest member of the grouse family in America.

11. *Ursus americanus*, the same as that of the black bear, for the cinnamon bear is but a color phase of the black bear.

CALIFORNIA FISHERY STATISTICS LAUDED.

Most of the middlewest states were represented recently at a Great Lakes Fisheries Conference which met at Lansing, Michigan, March 3, 1927. United States Commissioner Henry O'Malley acted as chairman. Approval was given and a number of regulations designed to equalize laws relating to the tak-

*Grinnell, Joseph and Wythe, Margaret W. 1927. Directory to the bird-life of the San Francisco Bay Region, Pacific Coast Avifauna No. 18, 60 pp., 1 pl. May be purchased from W. Lee Chambers, Business Manager, Drawer 123, Eagle Rock, Los Angeles County, California.

ing of fish in the Great Lakes. These regulations had to do with the use of gill nets and with size limits. Approval was also given to provisions designed to prevent pollution.

Of particular note was the following resolution which advocates the California method of handling fishery statistics: "It is the consensus of opinion of this meeting that the states should make provision for the collection of fishery statistics in such form that the statistics of one state will be comparable with those of other states adjoining the lakes so that the trend of these fisheries may be determined, comparisons of productivity per unit of effort made possible, and such other data as the biologists may require in following the trend of the fisheries and

they aid also in the reseedling of coniferous trees; (2) birds are the most important natural check on tree-destroying rodents; (3) birds are of great value in cutting down the numbers of an enormous variety of insect pests of the forest; (4) game birds of the woodlot are a source of increased revenue; and (5) bird life in general by making woodlands more attractive contributes to recreational values, both esthetic and material.

Evidently birds are a great asset to woodlots, and as such should be conserved. They can be protected, attracted to woodlots, and encouraged by simple and economical methods. Their care should be made a part of routine woodlot management. The constantly rising value of woodlots and their



FIG. 45. The home of the "Jerky Hermit" near Island Mountain, Trinity County. Deputy J. H. Hellard seized 180 pounds of jerky in this camp.

determining the need for more stringent or less stringent regulations as the case may be. A plan similar to the California system is recommended. Those making returns should do so under oath."

THE RELATION OF BIRDS TO FORESTS.

The summary of a bulletin entitled "The Relation of Birds to Woodlots in New York State," by W. L. McAtee (Roosevelt Wild Life Bull. 4, No. 1, pp. 1-148, illus.) contains the following terse sentences which have the backing of one of the best known economic ornithologists in America.

(1) Birds are indispensable agents in the natural dissemination of trees reproducing themselves by fleshy fruits and nuts, and

products fully justifies this care of birds especially since the activities of birds, for the most part, react so favorably upon the welfare of woodlands.

A "JERKY" HERMIT.

Information came to me in the winter of 1915 that jerky was being put on the train at Island Mountain in southern Trinity County and was being handled by the newsboys of the Northwestern Pacific Railroad. Suspicion fell upon an old hermit, William Hughes, who lived across the river from the railroad about six miles upstream.

In February, 1916, an attempt was made by Deputy Earl Barnes and myself to investigate this man's camp but a very severe

storm caught us and the trains failed to get through so we had to abandon our trip.

In April of the same year, the matter was again taken up. A search of the hermit's place failed to reveal anything. However the jerky continued to appear on trains. In the years following, work as I might, I could not locate the source of supply.

However, in the latter part of June, 1922, I learned that Hughes had a large supply of jerky just about ready to ship. I left Willits at two o'clock, walked down the track and crossed the river to Hughes' place. He was not there but had been the night before. A search of the place was made and about 180 pounds of jerky and the carcasses of seven deer were found around the place. There were two old mother skunks on long chains and each mother had six half grown kittens.

There was nothing for me to do but just wait for Hughes to return. I want to tell you that this was the longest wait I ever experienced. I surely thought it was days instead of hours. It was a hot day and the combination of the odors of deer carcasses and skunks, together with the flies were anything but pleasant.

Hughes finally arrived about eight o'clock in the evening. After arresting him I induced him to carry part of the jerky while I took the rest. We started for Ramsey station, which we reached about midnight.

The nearest justice was at Ruth, Trinity County, which meant a trip to Fortuna by rail and then stage from Fortuna to Ruth, about 160 miles.

Hughes escaped during the wait for the train and has not been heard of since. He was fifty-six years old and had lived in this place for 14 years.

In front of the tent to the right in the picture is a large rock against which he built his fire and over which he had some boards and old canvas. The tent was made of paper roofing and old sacks and was about seven by nine feet and about five feet high. His utensils were old cans and one frying pan. Near the tuft of grass at the corner of the tent is a spring.—John H. Hellard.

GAME PROPAGATION IN WASHINGTON.

The following figures will show the number of birds propagated at the two state game farms operated by the Division of Game and Game Fish of the State of Washington for the years 1925 and 1926.

The figures given indicate the number of birds propagated and do not include at all any purchases, or birds obtained by means of exchange or any other way. In 1925, however, Chinese pheasants to the number of 2730 were produced by two game farm licensees indirectly by means of help given

by this division in disposal, for it sometimes proves the case that with help given by this division in an indirect way, a game farmer is enabled to propagate a considerable number of birds, but these figures are not included in any figures showing production of the state game farms:

1925—	
State game farm near South Tacoma----	6,615
State game farm at Walla Walla-----	6,158
1926—	
State game farm near South Tacoma----	9,484
State game farm near Walla Walla-----	6,099
Grand total—number of ring-necked pheasants propagated for the seasons of 1925 and 1926-----	28,356

The propagation of the ring-necked or Chinese pheasant is the main activity of both of these game farms, although in connection therewith such fancy pheasants as the Lady Amherst, Reeves, golden and silver are likewise propagated and the number of such that were reared during the two years in question was 250. And a limited number likewise of other game birds such as Hungarian partridge, quail, etc., were produced, but these latter activities are always secondary for the propagation of such is not allowed to interfere in any way with any of the ring-necked pheasants.

SPECIFICATIONS FOR STATE GAME PRESERVES.

To be the most effective and prompt in increasing the supply of game, the new state game preserves—

1. Should be located in relatively large areas of wild land, having fair to good cover, so that the increase of game may spread out from the preserves and occupy the surrounding territory without difficulty or interference.
2. Should be located on relatively fertile lands, carrying a variety of natural growth and capable of producing large quantities of wild-life food supplies, natural and introduced.
3. Should be located so as to include a generous acreage of winter cover (usually cedar swamps) and, where practicable, they should have rough hardwood as well as pine land adjoining and easily available.
4. Should contain generous supplies of living water, which is easily available.
5. Should be so located and laid out as to make fire and other protection easily practicable at low cost (as for fire line construction, patrol, against trespass, etc.).
6. Should have, at present, at least a fair stocking with wild life, especially partridge and deer, so that artificial stocking will not be necessary.
7. A standard preserve should contain a centrally located, permanent refuge or sanctuary, with boundaries well posted, and further marked with a strand of wire.

The refuge or sanctuary should contain four to ten sections (2500 to 6500 acres, more or less).

Surrounding the refuge there should be a zone of state-owned land to be used as public hunting ground, and at least a mile in width, so as to make the total acreage of a standard state game preserve (refuge and hunting ground together) 10,000 to 18,000 acres, more or less.

8. To the extent practicable, lands already owned by the state should be used in building up the new preserves.

9. The first locations of new game preserves can best be made in counties covered by the Land Economic Survey, the maps of which show the full detail of cover, improved lands, assessed values, state ownership, etc.

10. Other things being equal, new game preserves should be located—

a. Where they will serve most promptly and effectively in maintaining and increasing wild life supplies.

b. Where local cooperation, as from land owners, sportsmen associations, etc., will secure satisfactory lands, at low cost or by donation, so as to involve a minimum of delay and expense in getting title to the land and in getting the new preserves under active administration.

11. When fully developed, each standard game preserve should have a resident keeper, a system of permanent fire-breaks, intensive vermin control, and such clearing and planting as needed in order to insure adequate wild life food and shelter during all seasons of the year.—Bienn. Rpt. Dept. of Conservation, Michigan, 1925-1926, pp. 189-191.

VERMIN AND QUAIL.

No list of vermin enemies can be compiled that will apply to all parts of the range of the bob white quail. Each locality must be studied separately.

The Cooperative Quail Investigation, that has confined its operations to southern Georgia and northern Florida, has assembled a mass of important facts of value to sportsmen and owners of quail preserves in that part of the country, which were reported by Herbert L. Stoddard, in charge of the investigation, at the recent National Game Conference of the American Game Protective Association in New York.

It has been found that the skunk is the most destructive to quail nests and that the cotton rat comes next, but the latter would not be encountered at all farther north. The cotton rat is also a competitor of the quail for its food supply. Raccoons and opossums rob quail nests, but the former confines its depredations to the vicinity of streams where quail do not nest abundantly. The opossum, however, ranges widely and is extremely prolific.

House cats and cur dogs take eggs and young and adult birds. Five species of snakes were found destructive, coachwhips, black snakes, gray colubers, red colubers and pine snakes taking quail of all ages and their eggs. These snakes also destroy the cotton rat. Only two species of hawks, the Cooper and sharp-shinned, were found destructive, though other hawks will occasionally take a quail. In this investigation the marsh hawk was found to be a valuable ally in keeping down the cotton rat and that it seldom killed quail when rats were available.

Observation of the crow proved it to be a serious enemy, especially in scant cover where quail nests are not well concealed. It is doubtful if it compares with some other enemies in good cover. Evidence was also secured against the weasel.

Persistent trapping can keep the furred species under control, but poisoning must be resorted to in order to keep down the cotton rat, especially when rodent-killing species have been depleted.

The question of vermin control is a very complicated one and the results of the Cooperative Investigation at this point can not be taken as a criterion for all other localities, where conditions may be entirely different. Where quail are to be maintained in large numbers, so that shooting is warranted, the nesting of the birds must be made as safe as possible, and those species of vermin that are found to prey upon the nests must be kept under control.

That does not mean that general, widespread campaigns of extermination are ever warranted, as the species which interfere with the increase of quail may be beneficial or harmless in other localities where quail are not found.

It is manifestly a matter of administering each locality as a unit after full investigation, in other words, a matter of game preserving on each separate area.—*The American Field*, Vol. 107, No. 8, pp. 196-197.

A BRIEF FOR THE PHEASANT.

The Idaho State Game Department in an effort to determine the amount of damage done by Chinese pheasants arranged to have a southern Idaho farmer shoot one male pheasant each month during the year. The man selected to make this experiment was C. F. Thacker and the crop of each bird killed was turned over to S. T. Queen, an instructor in the Napa, Idaho, high school. Queen analyzed the contents of the 12 crops and made a detailed report to the department.

The pheasant's diet would probably be indorsed by most dietitians for balance if not for all ingredients. For the most part it consists of wild seeds and leaves. But it also contains a great many bugs. Weeds and beetles suffer quite heavily at the game

bird's hands. In May the bird had swallowed 117 alfalfa weevils.

Corn was found in the crop only in February and December, while wheat appeared in March, August, September and November. A great deal of the wheat was in the hulls and it is believed that these grains were principally gleanings of the field. In only one month was the crop empty. That was June. Perhaps the first warm sun had made the bird a little lazy.

The detailed report follows:

January—Dandelion leaves, 399; small dandelion plants, 6; grass blades, 68; small grass plants, 4; lamb quarter seeds, 37; small

wheat in hulls, 20; red ants, 17; small beetle, 1; small rocks, 2.

September—Wheat, 94; wild millet, 427; alfalfa leaves, 14; thistle seeds, 2; spider 1; small rocks, 2.

October—Barley, 43; wild millet, 480; buckthorn, 49; grasshopper, 1.

November—Wheat in hull, 106.

December—Barley, 23; corn, 14; wild millet, 168; grass blades, 31.

THE FOOD OF TERNS IN ENGLAND.

Fish eating birds are continually accused of affecting the fish supply by depredations. The following review under the title "An



FIG. 46. Male ringneck pheasant in breeding plumage. State Game Farm. Photograph by H. C. Bryant, May 5, 1927.

seeds with hulls, 569; wild oat seeds, 2; ironweed leaves, 126.

February—Grains of corn, 37; ditch snail, 1; grass blades, 7; ground cherry, 1.

March—Lamb quarter leaves, 4; wheat grains, 6; wheat grains in hull, 102; grass blades, 5; wheat beards, 14; ground fern plant, 1.

April—Alfalfa leaves, 22.

May—Alfalfa weevil, 117; small beetles, 10.

June—Empty crop.

July—Clover leaves and stems, 63; grasshoppers, 8.

August—Wild millet seeds, 952; blue grass seeds, 39; clover leaves, 20; wheat grains, 56;

Investigation of the Food of Terns in England," (The Auk, July, 1926) is pertinent to the subject and shows that circumstantial evidence is not always supported by investigation, and that some other factor may be responsible for seeming decrease in food fish.

More or less parallel increase in a colony of terns at Blakeney Point, Norfolk, and decrease in fishes, especially commercial flat fishes, persuaded the fishermen that they stood in the relation of cause and effect. In response to complaints an investigation was carried on during the breeding season of 1925, and the stomach contents of 55 terns of three species collected during the period were examined by Dr. W. E. Collinge. His report with appendices from the committee in charge and by an *amicus curiae*, J. W. Allen has recently been published. Dr. Collinge found no flat fishes

whatever in any of the stomachs examined, so inevitably concludes that the terns have nothing to do with the decrease in the commercial catch of such fishes. Marketable fishes composed about a fifth of the food of the three species of terns, fishes locally consumed, a sixth, crustaceans and worms a little more than half, and insects and miscellaneous animal food the remainder. Interesting data on other phases of the life history of terns than the gastronomic, are also, included in the paper. Dr. Collinge's summary is:

"It seems clear that any shortage of inshore fishes at Blakeney Point can hardly be accounted for by the presence and preservation of terns.

"If the absence of inshore fish were due to the terns, then we should also have a scarcity of sand-eels, various crustacea, annelids, and marine molluscs, whose percentage far surpasses that of the food fishes eaten, but there are no such signs.

"We are, therefore, thoroughly convinced that the recent scarcity of flat fish at Blakeney Point is due to some other factor, and feel certain that if the whole of the tern population of Blakeney Point were to migrate elsewhere, the result would not be marked by any increase in the fisheries.

"To those acquainted with fishery investigations, these migrations or diminutions are nothing new and their cause or causes still remain unsolved, but of one thing we are quite certain, viz., that the feeding habits of terns or any other sea-birds bear no relation to them."—W. L. M.

GAME AND FUR FARMERS AIDED BY U. S. SCIENTISTS.

The decrease in areas in the United States suitable for wild fowl breeding grounds emphasizes the need for propagating wild ducks, geese, and other birds on game farms. The Biological Survey of the United States Department of Agriculture for many years has encouraged measures to this end, and its latest help for game breeders is a Farmers' Bulletin (No. 1521-F) just issued under the title "Propagation of Game Birds."

The bulletin points out that the possibilities of game-bird propagation have long been recognized, both abroad and in this country, and that enough has been accomplished to prove that increase in successful game farming is limited only by the area, the expenditure, and the effort devoted to it. Many methods that assure success are known, and these are treated concisely in the new publication.

The Biological Survey's activities in promoting game farming are to be noted in a greater number of official publications of the United States Department of Agriculture and in special mimeographed leaflets on particular phases of the subject. A review of these reveals no less than 65 titles, covering the propagation of birds and of fur and game mammals. These bulletins and leaflets have been devoted either wholly to the purpose of increasing the number of these valuable birds and animals through artificial propagation or have made favorable mention of the subject in compiling facts to aid in the solution of the game breeder's problems. Chapters on propagation have been included in all the bulletins containing the annual summaries of the game laws of the United States and Canada for more than a quarter of a century.

Ever since the activities of the Department of Agriculture were extended to game preservation, in 1900, recommendations have been made in publications of the Biological Survey favorable to importations of game birds and eggs for propagation, and the necessary importation permits have been issued. With the passage of the migratory bird treaty act of 1918, the Biological Survey began issuing permits for the possession for propagation on farms of such waterfowl as twice each year pass back and forth between the United States and Canada on their migratory flights.

Investigations are now being conducted in southern states for increasing the supply of bobwhite quail, including a study of the control of diseases and of natural enemies of the birds. Investigations also are being made of practical methods of capturing beavers alive and planting colonies in areas where they will not only not be destructive to forestry and agricultural interests, but where they can make lands that are otherwise useless productive of valuable and interesting fur bearers. All phases of fur farming are being studied and recommendations on the subject offered in a number of bulletins. Special studies also have been made for the improvement of Alaskan reindeer, and experiments are now under way in cross-breeding with native wild caribou, with a view to developing stronger and heavier reindeer with increased meat weight.

Preliminary to a still more active educational campaign in the interests of game bird farming, the Biological Survey is sending W. L. McAtee, author of its bulletin on "Propagation of Game Birds," to certain European countries. During the next three months he will visit world-famous places in Holland, Germany, France, and England to investigate the propagation there of migratory waterfowl, some of which are of the same species as occur in the United States. The methods and equipment used will come under his observation and study, both as regards American species of birds propagated there, and those species that have rarely or never been introduced and raised in this country.

In addition to the recommendations made for rearing the game birds treated in the latest bulletin, such as pheasants, quail, ducks, geese, partridges, grouse, wild turkeys, and swans, the Biological Survey has issued instructions both in its publications and in its demonstrations for rearing many other useful species of wild life on game and fur farms, such as deer, elk, reindeer, silver and blue foxes, muskrats, hares and rabbits, skunks, martens, minks, otters, opossums, raccoons, and beavers.

The number of persons now breeding game birds and other forms of useful wild life for commercial and personal use is rapidly increasing, and many owners of large country

estates are interested in our beautiful species of wild fowl and in perpetuating them while it is still possible. Practical information of value to prospective game breeders is to be found in many publications of the department still available for distribution and more will undoubtedly be developed from the studies now being made in Europe.

A leaflet issued about ten years ago and kept revised, listing publications of interest to game breeders, and one listing publications on fur and fur animals will be furnished applicants free on request addressed to the Biological Survey, United States Department of Agriculture. Farmers' Bulletin (No. 1521-F), "Propagation of Game Birds," supersedes several former bulletins and leaflets, and will be sent to anyone on request as long as the supply for free distribution lasts.

REVISED HUNTING AND TRAPPING REGULATIONS ISSUED FOR ALASKA.

Revised regulations relating to game animals, land fur-bearing animals, and birds, in Alaska, recently adopted by the Secretary of Agriculture after recommendation by the Alaska Game Commission and approval by the Biological Survey, become effective in the territory on July 1. Only such changes were made in the previous regulations under the Alaska game law as seemed necessary to meet changing conditions and to correct defects. Although all the changes are important in certain areas, only the following four of the fourteen made are of general interest:

The caribou season in that part of fur district No. 2 north of the summit of the Alaska Range and Ahklun Mountains now opens on August 1 instead of September 1, ending on December 31 as heretofore.

The period September 1 to June 20 is fixed as the open season on black bear in fur district No. 2, but in that portion of the district south of the Alaska Range and Ahklun Mountains a bag limit of two during the month of September is prescribed. This change lengthens the season approximately 7 weeks in the southern portion of the district by permitting black bears to be taken during the month of September and as late as the 20th of June. The open season was formerly October 1 to May 31 in that area.

The opening and closing dates of seasons on certain fur bearers in designated areas were changed to meet local conditions. The most important of these is the provision opening an area in east central Alaska to beaver trapping during the month of April, with a seasonal bag limit of 10 beavers to each trapper.

Nine small areas adjacent to Alaska Railroad are designated in which the taking of fur-bearing animals and game is prohibited.

These areas, by executive order of February 21, 1927, were set aside as preserves and breeding grounds especially for heavers and muskrats, in order to retain them as attractions to travelers along the line of the railroad.

By recent changes in the migratory bird treaty-act regulations, a continuous close season for two years is placed on greater and lesser yellow-legs both in the several states and Alaska and this amendment has the effect of abrogating the provisions of the Alaska game regulations with respect to seasons and bag limits on these birds.

The complete text of the new Alaska regulations including maps showing the districts and the text of the Alaska game law (Alaska Game Commission Circular No. 3) may be obtained free, as long as the supply lasts, from the United States Department of Agriculture, Washington, D. C., or from the Alaska Game Commission, Juneau, Alaska.

UNIFIED PLAN FOR ELK CONSERVATION.

For years the conservation of the elk herds ranging in the vicinity of Jackson Hole, Wyoming, has been a source of great concern. These herds, now believed to number approximately 30,000 head, are a great economic asset of national importance but their existence is jeopardized through the continued restriction of the winter range and the lack of a long-term method of game management. The summer range, largely within federal and state reservations, is regarded by federal officials as sufficient. The problem is to restrict the numbers of elk to the available food supply. Under present conditions great numbers starve to death on the winter range during severe weather. Such an unnecessary waste of a natural resource is considered deplorable.

Through the efforts of the state of Wyoming, citizens of Wyoming, the United States Biological Survey, and the Isaak Walton League of America, the herds have been maintained by the winter feeding of hay in Jackson Hole. But the problem of starvation is recurrent and can only be solved by a coordinated plan of management worked out by all agencies interested.

REEDBIRDS, OR BOBOLINKS, NO LONGER PERMITTED TO BE KILLED.

By an order of the Secretary of Agriculture it is no longer permitted to kill reedbirds, or ricebirds, known in the North as bobolinks. In 1919, owing to serious depredations of bobolinks on the rice crops of North Carolina, South Carolina, Georgia, and Florida, permission was granted by the Secretary, under authority of the migratory bird treaty act, administered by the Biological Survey of the United States Department of Agriculture to

kill these birds in Pennsylvania, New Jersey, Delaware, Maryland, the District of Columbia, North Carolina, South Carolina, Georgia, and Florida for the protection of rice growers. This permission is now revoked.

Under the new order, a person or members of his immediate family or bona-fide employees, owning or leasing lands in North Carolina, South Carolina, Georgia, or Florida on which rice is being grown, may shoot bobolinks or ricebirds, only when authorized by a special permit issued by the Secretary of Agriculture and countersigned by the chief official in charge of the enforcement of the fish and game laws of the state in which the permit is effective, and only during the period from August 16 to November 15, inclusive, on rice fields where such birds are seriously injuring the crops. The birds so killed may be consumed as food, but may not be sold.

COUNT OF JACKSON HOLE ELK MADE BY OFFICIALS.

A count of elk in the Jackson Hole, Wyoming, herd has been completed by members of the Biological Survey and the Forest Service, of the United States Department of Agriculture, and the State Game Commission of Wyoming, accompanied by representatives of the Izaak Walton League of America. Reports of the count to the department show that the herd now numbers 19,238, a total that is only slightly different from the figures resulting from a similar count made two years ago. At the time of the count nearly half the elk were on the feeding grounds of the winter refuge maintained by the Biological Survey. That the herds are still within the optimum number of 20,000, set by the recent Elk Commission created by the President's Conference on Outdoor Recreation, came as some surprise to government officials. They state that in a disastrous winter six years ago thousands of elk died from starvation, leaving a remnant of only 9346, as noted in a count then made under the same auspices as the one just completed. A doubling of the numbers between 1921 and 1925, when the count showed 19,483, suggested that a continued increase might be expected, especially as recent winters had been favorable to the elk and comparatively few had been killed by hunters.

Unexpected results like these, according to officials of the Biological Survey, emphasize the necessity of a thorough-going study and general investigation of all conditions affecting the welfare of the great herds of elk of the whole Yellowstone region. Following out the recommendations on this matter made by the recent Elk Commission, the Biological Survey is formulating plans for beginning the work. Information will be assembled regarding all factors affecting fluctuations in the numbers of the elk.

Biologists of the government point out that the southern Yellowstone elk in winter migrate for the most part southward to the vicinity of Jackson, Wyoming. Several hundred, however, have recently been reported west of the Tetons in Idaho, and there is some intermingling eastward in Wyoming with herds along the Wind and Green rivers, which may account for the apparent lack of increase in the numbers about Jackson. However, an insufficient crop of hay produced on the elk refuge, even if supplemented by the purchase of hay by the state game commissions in an unusually severe winter, could easily bring about a repetition of former disasters, when an over-concentration of elk on limited areas exhausted for all of them the forage that would have supported normal numbers.

It is to prevent the starvation of elk by thousands, disasters that all but wipe out the herds, that the official and individual conservationists interested are working. Present plans call for maintaining the Wyoming herd in numbers not to exceed 20,000 and preventing an accumulation of what could easily become an unwieldy surplus, threatening through starvation on a large scale the existence of the herd in even optimum numbers. The present count, though not yielding the large figures that had been anticipated, shows that the Wyoming elk have for two years been close to the danger line in abundance, a point beyond which they can not advance without threat to the permanence of the herd as a whole.

CALIFORNIA FORESTS, ONE OF THE STATE'S GREATEST NATURAL RESOURCES.

California's forests have produced far greater wealth than the combined output of her world-famous mines, according to a descriptive bulletin, "The National Forests of California," which has just been published as Miscellaneous Circular No. 94-M, by the Forest Service, United States Department of Agriculture. The annual value of the lumber products of the state is about \$62,000,000.

"The Spanish explorers who were attracted to California in the early days were right in their assumption that the region possessed wealth beyond the dreams of avarice," says the bulletin, "but they missed the one kind of wealth they sought—gold—and they failed to realize the wealth that is in her forests and waters, wealth now being derived from a thriving timber industry and from prosperous irrigated farms and orchards."

The eighteen national forests of California cover nearly one-fifth of the total area of the state and contain resources valued at \$300,000,000 not taking into account their value in protecting the mountain watersheds

upon which depend nearly all the actual and potential major irrigation and hydroelectric power developments of the state, and the continuity of municipal and domestic water supplies.

The national forests in California are managed with a view of perpetuating their vast resources. In all lumbering operations on the government's forest lands only the mature trees, previously designated by forest officers, are cut, and precautions are taken in felling and slash disposal to protect the young growth from fire or other injury. Every effort is made to keep the lands producing timber up to their full capacity.

California was one of the earliest states to give thought to the care of her natural resources and as early as 1850 the best thinkers of the state were urging scientific care of the forests. Notwithstanding this fact there are nearly a million and half acres of privately-owned cut-over lands in the state now producing but a small part of the timber that could be grown on them. Also some 50,000 acres a year of privately-owned forest are now being logged off, of which at

least 40 per cent is left in an unproductive condition.

Stock raising is the oldest industry in the state, and at one time was attended by violence and range wars, says the bulletin. Today the Forest Service effectively regulates the grazing on 24,000,000 acres of government and private lands within the national forests.

The circular gives an interesting account of the early history of California's forests, the national forest resources in the state, the value of forage in the forests, recreation possibilities and scenic attractions, wild life, the administration of the national forests, the development of forest roads and trails, the causes and means of preventing forest fires, and production and consumption of lumber in the state.

Copies of this bulletin may be obtained free of charge, as long as the supply lasts, from the District Forester, U. S. Forest Service, Ferry Building, San Francisco, California, or from the United States Department of Agriculture, Washington, D. C.



Commission Activities.

During March a tentative four-year budget was presented to the State Board of Control by Executive Officer Greene. This first attempt to present a definite program to the legislature met with instant commendation. An analysis of this budget was mailed to all of the newspapers and to sportsmen's organizations.

The end of the fiscal year found the various departments thoroughly equipped, the old hatcheries rebuilt and put in proper condition, several new hatcheries completed and the State Game Farm fully equipped for maximum production. Furthermore, all expenditures were well within the budget.

During the month of March, O. P. Brownlow, deputy at Porterville for many years, was promoted to "Captain at Large" to take charge of fish planting of the Commission. Brownlow is well qualified for this work by years of experience in patrol and fish planting. He has changed his headquarters to San Francisco and is now traveling around the state, meeting with the captains and others interested in fish planting, and outlining his campaign.

Department of Patrol.

Pheasant dinners are costly affairs, as a hospitable native of Portugal learned to his sorrow during April. Deputies Charles Sibeck and N. Poole descended upon the young man with a search warrant after twelve persons had just finished a pheasant dinner. The wardens had been watching the young man's movements, but as he returned from hunting after dark, it was necessary to get the warrant. One pheasant was found that had not been used at the feast. Justice E. H. Barker of Galt fined the "poacher" \$500 with the alternative of 180 days in jail. This pheasant dinner was certainly costly.

Captain of Patrol K. P. Allred has been assigned to a new district composed of Monterey, San Benito and San Luis Obispo counties. He took over the work on May 16, and has five deputies under him. The men are H. E. Black, Ralph Newsome, F. H. Post, J. H. Hill and J. P. Vissiere.

In considering the importance of planting trout several factors enter: First, we must not overlook extension work—barren waters and waters in inaccessible places must be stocked to provide a supply of fish for the future; second, minimum stream flow is a very important factor and should be watched closely—how useless it is to plant fish in a

stream that is dry in August; third, in considering the needs of any stream we must always keep in mind the fact that the fish are the property of the people of the State of California. Thus does O. P. Brownlow, in charge of fish planting, sum up this difficult problem.

Jay Bruce, State Lion Hunter, has finished his work in southern California with ten "cats" to his credit. At present lion hunter Bruce is training dogs to replace some of his veterans, that have earned a vacation after long terms on the trail. Fox hounds are the preferred breed. Out of about eight he tries out he gets two dogs that will work. It takes at least two years and a kill of fifty lions to make a real lion dog. Sometimes a dog shows his class after a couple of the beasts have fallen, but it generally takes a lot longer. It is a tedious job. State Lion Hunter Bruce is regarded as an authority on hunting mountain lions and training dogs for this particular work.

Deputy E. D. Ricketts, of Los Angeles, estimated that there were 946 boats containing fishing parties on Big Bear Lake on May 1. This lake seems to be the most popular for anglers of southern California and approximately 200 limits of rainbow trout were taken the opening day.

A fine of \$200 was recently assessed an angler by Justice Ray Baugh, of Salinas. This man had one hundred trout more than the legal limit of twenty-five in his possession when he was apprehended by deputies Fred H. Post and Ralph Newsome.

June Lake in Inyo County, a lake well-known to anglers is not to be open for fishing until June 1 after this year. An act to this effect was passed by this year's legislature. Having the lake closed until the end of May will afford the hatchery men an opportunity to secure a record catch of steelhead eggs next year. This year an area was marked off by a cork line in which no fishing was allowed so that the men from the Fern Creek Hatchery, which is located between Gull and Silver lakes, could secure fish for spawning. This marked-off area was guarded by Captain Clark and Deputy Bundoock who camped on the shores of the lake, maintaining a twenty-four hour vigil, explaining to the anglers why the area was closed. The fishermen cooperated with the officers and the hatchery men were thus able to secure more than 1,000,000 eggs.

June Lake, although only a mile long and about one-half mile wide, yields to anglers at least one ton per day of fish, average of

four pounds each. The lake furnishes the necessary food, a freshwater shrimp, that thrives on the grassy bottom of June Lake, and also a black bug, similar to a ladybug. This together with the fact that the water has the right temperature and the lake is evidently fed by hidden springs, results in the production of a fine quality fish.

The dollar-a-year wardens are getting some effective results. A summary has been prepared by Walter R. Welch, in charge of the force, which shows that a territory of 66,964 miles has been covered resulting in 79 arrests and fines of \$2,710 assessed. The men have rendered valuable assistance in checking licenses as well as in making arrests and seizures.

Department of Fish Culture.

Flood conditions make extra work for hatchery employees. During February, mud and trash was carried into the troughs of the Fort Seward Hatchery to a depth of two to four inches. For three days and nights the men had to be on duty constantly in order to keep the screens and flume clear. Removal of such debris must be carefully done to prevent injury of the fish in the troughs. Even southern California stations suffered. At the Bear Lake Hatchery water broke in the rear door of the cottage and filled it with five feet of snow and water. It also filled the hatchery and piled the troughs in every direction. Tops were torn from the permanent racks in North Creek. One hundred and fifty feet of supply flume carried away and supports torn from the remaining flume.

The Kaweah Hatchery was moved early this spring to its original location at Power House No. 1 where the water supply is much better. The Tulare County road crew kindly built 800 feet of road from the Giant Forest Highway at Hammond to the hatchery, the Commission paying only for the labor, powder and culvert.

The spring take of trout eggs at the Klamath River auxiliary stations was very disappointing. The run was the smallest in years. Fall Creek which produced 274,000 eggs during March of last year produced but 24,000 during the same month this year.

High water did little damage at the Beaver Creek egg collecting station because of a dam with concrete piers and apron. More eggs were secured at this station than elsewhere but even this take was considerably less than that of last year.

At the Mount Whitney Station more than a million trout are on hand, 650,000 of which are eastern brook. A pond contains 150,000 rainbow trout that are nearly four inches in length having been held over from last year's hatch.

Fort Sutter Hatchery planted close to a half million salmon the latter part of March.

The Camp Creek Egg-collection Station on the Klamath River was badly damaged by February floods. The racks were completely swept away. Had not the county bridge, which was carried away by the swollen stream, lodged against the holding tanks and turned the water, the tanks and cabin would likewise have been carried down stream. It was necessary to build a new flume and make numerous other repairs, but the station was able to renew spawning operations by the middle of March.

The Hornbrook Station suffered more than Camp Creek. A washed-out county bridge swept away the concrete holding tank and the cabin. No trace of the cabin has been found and doubtless it went down the Klamath River. Not only was the station completely wrecked, but the creek shifted to a new channel some distance away. Repairs were made, however, and the station continued to function during the spawning season.

The unpreventable loss occasioned in holding trout in ponds is evidenced by the count of some fingerlings planted in Santa Cruz County streams during March. Last fall 101,000 steelhead were placed in a pond at the Brookdale Hatchery. When the ponds were drawn down and the fish moved to streams for planting, 57,000 were counted.

The Brookdale Hatchery has supplied other hatcheries with 583,000 steelhead eggs and has approximately 1,000,000 left.

Fair takes of eggs are reported from the Lake Tahoe Egg-collecting Stations in spite of the fact that high water damaged the traps. Heavy snow made it impossible to secure rock for making repairs and temporary resort was made to brush and gravel. The number of fish in the creeks tributary to Lake Tahoe is greater than at any time during the last seven years.

Fingerlings held in a tank on Blackwood Creek failed to grow satisfactorily owing to the lateness of the season and the extreme cold water. They were distributed during the spring months.

Biologist Coleman made a survey of Prairie Creek and tributaries in Humboldt County this spring to determine the com-

parative numbers of steelhead and cutthroat trout and to gather data on the spawning of cutthroat trout.

More recently he has been busy investigating an infection among some of the salmon fry at Mount Shasta Hatchery as well as studying the pathogenic condition of the trout fry in Brookdale Hatchery.

Department of Commercial Fisheries.

The spring lobster season in southern California ended with fewer violations being reported than ever before. The catch was light on account of stormy weather which destroyed the fishermen's traps. The Mexican fisheries extended their season one month so as to let the fishermen recoup their losses.

The State Fisheries Laboratory is securing a series of photographs of all of the fishes of commercial importance. Thus far seventeen species taken at San Pedro are on file. It is hoped this series of photographs will form the basis of an illustrated booklet giving a brief write-up of each important commercial species of fish.

Sardines were scarce at San Diego this past spring seriously interrupting the sampling records taken by the State Fisheries Laboratory as a basis for studies of age and rate of growth.

Two of the large canning corporations of southern California have made arrangements to import frozen Japanese albacore from Japan using a cold storage boat. A test run of two tons brought over resulted auspiciously.

Bureau of Education and Research.

Dr. H. C. Bryant, Director of the Bureau of Education and Research started his eighth season in charge of the Nature Guide Service in Yosemite on the 26th of May. This summer resort educational work has been highly successful, reaching thousands of vacationists when they are most interested in natural resources. A staff of eight men will be necessary to handle the crowds expected this year. The program includes lectures and field trips.

Evidence of an attempt by this bureau to forestall a loss to deer through the taking of fawns by uninformed persons is to be found in the following letter and nature lesson sent in quantity to every school superintendent and every game warden in the state:

Dear Friend of Conservation:

The Fish and Game Commission enlists your aid in solving one of its problems. In the late spring and summer months deer give birth to their fawns and it is at this time that the Fish and Game Commission receives numerous letters advising of the finding of baby fawns. It is in answer to these letters that we are issuing the enclosed nature lesson for your students. We also wish to stress here that it is a violation of the law to take these fawns and we trust that the facts cited in the lesson may help conserve this year's increase.

Sincerely,

H. C. BRYANT,
In Charge,
Bureau of Education and Research,
California Fish and Game Commission.

A TIMELY NATURE LESSON.

In late spring and early summer deer leave their winter quarters and go into the higher mountains. The bucks whose antlers have started to grow again seek shelter along the higher ridges. The does hold to the mountain meadows and to the ridges near lakes and streams. Here on one of these brushy ridges the mother deer finds a secluded place and gives birth to twin fawns. For the first few days the young lie quietly in the shelter of a bush being dependent upon their protective coloration (a white-spotted, reddish brown coat blending with the ground) and lack of odor to escape detection. The mother leaves the fawn only when necessary to obtain food and water, never going far and always standing guard, alert to every motion or sound.

To these same fawning grounds come fishermen and mountain hikers, recreation bent. By chance they discover a fawn. Truly, it does seem lost and abandoned by its mother! It is thin and starved looking. It instinctively plays "possum" when touched, strengthening the theory that it is weakened by starvation. "Poor thing! Let's take it to camp and rear it on a bottle," is the usual comment. So the little creature is carried away while the helpless mother looks on from some concealed vantage point. Then come days of exacting care usually followed by the death and burial of the fawn.

To see a new born fawn is a rare privilege and one's appreciation is much more intelligently expressed by leaving it undisturbed. To carry it back to camp instead of leaving it to the care of its natural mother is to commit an act in violation of the law. Though summer vacationists may think they are performing an act of benevolence, they are in reality but kidnappers and rightly do they deserve all the derisive thought that goes with the name.

The Fish and Game Commission looks with disfavor on "fawn kidnappers." A letter directed to it for a permit to keep a fawn will be met with a rebuke. Very rarely do bottle-fed fawns live and because the Fish and Game Commission exists for the purpose of conserving the wild life of California, it can not give its sympathy to acts that so materially reduce the deer supply.

A teacher's bulletin which is a revision of a former one entitled "Bird Study in the Public Schools" is being prepared for publication. This bulletin was in great demand for several years and the supply has long since been exhausted. It has now been completely revised by the original author, Gretchen Libby, and a new annotated list of birds will be appended.

This is but a start on numerous publications of this kind that are contemplated.

Bureau of Hydraulics.

Oil pollution conditions in the southern California coastal district have improved in the past few months. The oil companies, on account of the warnings given them to clean up and keep cleaned up and to safeguard against spills, have been very good about trying to keep the oil from getting away from them. When one considers the amount of production, transportation and the number and capacity of refineries in this district, it is remarkable that there is so little oil getting away from the companies here. Most of the trouble comes from the smaller, independent stock companies who are operating here. They do not take the precautions that the older and larger companies do. Consequently it is necessary to follow up with warnings and inspection as new ones come into the field and some of the older ones become careless. Los Angeles is now the largest shipping point for oil in the world. All vessels loading or unloading cargo here take bunker oil. It is not only the largest shipping point, but oil is cheaper here than at any other point in the world. During the past year there were 122,915,528 barrels of oil (cargo oil) shipped out of this port; this besides that taken by ships going and coming for bunker oil, and by the fishing fleet of 750 fishing and tender boats which work out of this port.

Operations of the new oil reclamation pipe line and sump system of Oil Producers, Inc., an organization of big operators in the Signal Hill and Long Beach fields, began on March 29. Installation of this system was the result of the activities of the Bureau of Hydraulics toward the elimination of pollution in Long Beach harbor. Suits naming twenty-one of the largest operators in a complaint of violation of section 635, California Penal Code, were filed by the Commission.

More than \$100,000 was expended in the laying of the pipe lines and installation of the sumps. The new sump system, covering over 15 acres of ground, is located at Flood Control Channel and Wilmington Road, Long Beach. The pipe lines leading to this point are more than 10 miles in length. A large dehydration plant will be erected alongside the sumps to care for all oil thus reclaimed. The system is calculated to care for all wastes of oil fields of that vicinity, extracting the oil and discharging only clear water into Long Beach Harbor. It is hoped thus to prevent the wholesale slaughter of fish in the harbor and streams flowing into same.

It will be many months before conditions in the Long Beach, Signal Hill, Los Cerritos and Huntington Beach fields will be normal, but the installation of this pipe line and sump system will do much toward bringing about better conditions.

The General Petroleum Company was recently convicted on a charge of wilfully and deliberately polluting the waters of the Ventura River. Superior Judge A. C. Henderson, before whom the case was tried, assessed a fine of \$500, which was suspended for a period of six months, dependent upon future activities of the company. Ventura County officials have declared that another violation of this nature on the part of the company will meet with maximum penalties.

The General Petroleum Company was charged with cutting the walls of its sump along the banks of the Ventura River, and allowing a large amount of polluted water to escape into the river and harbor, with subsequent deleterious effect upon fish life.

A fine of \$200 was assessed by Justice of the Peace John P. Gallagher to the Shell Oil Company for polluting the waters of Petaluma Creek. A barge captain in unloading the fuel oil at the Petaluma station allowed the oil to overflow. The oil was on the surface of the water and the banks of the creek for five miles were soaked. A crew of men were put to work to remedy the condition. This they accomplished in a very satisfactory manner.

Bureau of Public Relations.

Major Rolin G. Watkins, former director of the Bureau of Public Relations, resigned May 1. He has been succeeded by Frank H. Vore, an experienced newspaperman, former editor of the sporting page of the *Fresno Bee*.

Efforts to educate the public relative to an abuse which has been assuming sizable proportions in recent years—that of taking baby fawns home to raise on a bottle—led to the simultaneous broadcasting by four stations in one evening in early May of suitable information. The courtesy of these stations in helping in this regard will long be remembered.

The director of this bureau visited the State Game Farm and the main state hatchery at Mount Shasta City. These trips resulted in the releasing of a number of descriptive articles which received wide publication throughout the state.

The story outlining the Commission's plan of fish planting to be placed in operation this year and the plea for the help for fawns were the two that received the widest attention by California newspapers. All papers are giving this bureau wonderful cooperation.

The duties of the director include the establishing of valuable contacts through attendance at meetings, luncheons, conferences and the like where the message of conservation is carried many times to persons not acquainted with the program but willing to learn.

This in addition to the sending out of from four to seven stories weekly, based on the activities of the Commission from actual records and first hand information make this bureau an exceedingly busy one.

The first pheasant egg was gathered on March 8 and by the end of the month the production reached a hundred. The first setting of eggs hatched April 12. On May 6, a hatch of over 800 were moved to pens.

Several broods of ring-necked pheasants were exhibited at the Sportsmen's Show, May 14-22. We were all proud of this exhibit which consisted of eight pens, seven of pheasants and one of partridges.

Six mountain quail eggs were received from Deputy Groves. Eight sagehen eggs were received from Deputy Fisher. The successful hatching of these eggs constitutes the beginning of a series of experiments to determine what native game birds can be propagated on game farms.



FIG. 47. A domestic hen with her brood of pheasant chicks. State Game Farm. Photograph by August Bade, April, 1927.

Bureau of Game Farms.

The breeding stock at the Yountville Game Farm at the beginning of the laying season this past spring included 600 ring-necked pheasants. They were from stock raised last year and were hand-picked. Thirty pair of valley quail and one of bobwhite were saved as breeders also. In February, thirty pair of Hungarian partridges were purchased. Nine or ten pair soon showed that they were well mated.

March was a busy month at the game farm for all the pens were cultivated and planted so as to furnish food and cover for the young birds. Farm work is a necessary part of game propagation.

Bureau of Statistics and Game Problems.

The fur trapping report for 1925-1926 has been completed and both the total catch of furs and revenue received by the trappers show an increase over the previous season. The preparation of fur trapping data for 1926-27 is now in progress.

Laboratory facilities have been increased, thus making possible an enlarged scope of activity. Complete equipment for water analysis has been purchased, also additional equipment for bacteriological and pathological investigations have been secured. A temporary laboratory has been installed in the office and a new room is being prepared at the Hooper Foundation for Medical Research.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

CALIFORNIA'S FISHERY STATISTICS.

The system in effect in California of gathering fishery statistics was inaugurated in 1918 in southern California and later put into effect throughout the state under a statute passed by the legislature in 1919. This statute requires that all persons dealing in fish must use receipt books of a form adopted by the Fish and Game Commission, and it is unlawful to use any other form of receipt in the purchase of fish. We use three forms in California, known as the packers' receipt book, fresh fish dealers' book and trawler record.

The law requires that the white or first copy be given to the fisherman at the time fish are purchased. The yellow copy is retained in the book by the dealer or packer, and representatives of the Fish and Game Commission gather the pink or triplicate copies, which are brought to this office, or our branch offices at San Pedro and San Diego, where the records of the catch are compiled, showing the amount of fish received by each dealer.

After the records have served their purpose in this office, they are forwarded to the California State Fisheries Laboratory at Terminal Island, where they are segregated by boats and filed away for future reference of our biologists or investigators who might wish to work on any certain species of fish. With these records filed by boats, we are able to follow the boat catch right through the year, or for several years, and gain knowledge that it is practically impossible to secure in any other manner.

The receipt books are supplied by the Fish and Game Commission, the dealers' books costing us between twenty-five and thirty cents, while the packers' books and the trawler record books cost between twenty-two and twenty-five cents per book. Each dealer is furnished such books as he will require for several months' use, and a complete record is kept by our various offices. When the pink triplicate copies of tags are gathered up, the tags are checked in this office to see that no books are overlooked, misplaced or destroyed by the dealer. We have little difficulty of this sort. Occasionally a book has been burned or lost overboard, in which case we lose the record, but this only occurs on rare occasions, in case of accident.

Our greatest difficulty in California is control of fish buyers who operate on a small scale, particularly in Del Norte and Humboldt counties. That is, they work on the Klamath River during the salmon run there in July, August and the first five days of

September, then go to Smith River and operate there during the open months of September, October and November, and are out of business the balance of the year.

They purchase their fish from fishermen and haul it to Eureka or into Oregon and we have had considerable difficulty in keeping tab on them, although at the present time we have them pretty well under control.

Our regular dealers are very glad to use these books, as they are saved the expense of furnishing their own receipt books, also the bother of making up reports for the Fish and Game Commission. The only improvement we might make on the system would be to have more men collecting the triplicate tags and calling on the dealers weekly or semi-monthly, which we can not do at the present time on account of the few available men for this work. At times we have to wait two or three months before we make the rounds of all the dealers, and in some cases we ask the dealers to mail the tags to this office, though we try to avoid this as much as possible.—S. H. Dado.

PEARL ESSENCE IN SAN PEDRO.

A plant for the manufacture of "pearl essence" from sardine fish scales, the first of its kind in California, has just been opened on Terminal Island, (East San Pedro), California, by the Dallas Pearl Essence Company. This new by-product of the great fishing industry is a liquid used in coating artificial pearls, the backs of combs, brushes and all kinds of dressing table sets. About three to four hundred pounds of scales in the moist form are necessary to make one barrel of scale water, which, in turn, produces about one pound of pearl essence marketable at from \$60 to \$200, depending on its quality. Mr. Davis, head of the company, has been working for almost three years on a method similar to that developed by the Technology Division of the U. S. Bureau of Fisheries for removing the pearl essence from scale water, and is now confident of a marketable product.

Pearl essence can be made from the scales of any kind of shiny fishes, but, of course, more profitably from some than from others. From the scales of fresh water shad is produced a particularly clear liquid which is worth \$175 a pound. Salmon scales produce a very pure pink essence.

The scales are taken from sardines when the fish are delivered to the canneries. They should be obtained as fresh as possible, since, when they are allowed to stand, the proteins in the scales soon begin to ferment, with the formation of fatty acids. Oil and fat are very difficult to remove from the scale water,

and until they are removed, the product is not marketable; however, scales can be used as long as twelve hours after the fish have been caught. The ideal way to collect them would be to station gatherers on fishing boats to get absolutely fresh fish scales. They should also be obtained as clean as possible; the attempt is therefore made to get them from the scaler, which scales the fish directly from the weighing bucket before the head and viscera are removed. When they are obtained in this way, blood and remaining particles of viscera are not mixed in with the scales.

A screen is placed around the inside of a centrifugal tub in an apparatus similar to an electric washing machine. The scales are placed in this and agitated in water for about five or ten minutes. This process washes the lustrous substance from the scales and suspends it in the water, which is then drained off into a barrel. From the barrel the scale water is drained into five-gallon glass bottles until they are two-thirds full. About three quarts of pure ether are then put into the bottle and the whole is well shaken. The mixture of scale water and ether forms a colloidal liquid. Some pure pearl essence, which is of a very light gray color, soon collects on top of this mixture; while immediately below is a thicker dark layer of pearl essence and ether in a colloidal state, suspended in a dilute solution of water and ether. Below this is scale water, which constitutes three-fourths of the total, with a large percentage of the lustrous material removed. This solution is drained off and treated again as before to get all possible value from it. The upper two layers are treated with ether several times until all the water, oil, and other foreign substances are removed. The result is a pearly looking fluid. When this is agitated in a small bottle one sees very thin light blades floating in the liquid, and turning over like narrow strips of paper falling through the air.—Virgil G. Russell, January 28, 1927.

KEEPING SMALL SARDINES FIRM BY REFRIGERATION.

To keep sardines firm before and during cutting, the California Packing Corporation has installed a refrigeration system, the first to be operated at San Diego. It is used primarily for quarter-oil fish, which, being small, take considerable care and time to cut. Previous to the installation of freezing devices, they were often soft and broken at the end of the cutting process, and therefore would not make as uniform a pack as was desired. Waste was also very great. Now, however, sardines are kept at a temperature a little above the freezing point, and so remain firm throughout the cutting period. With refrigeration the sardines are always in a perfectly fresh state when cut.

Cooling is accomplished by indirect expansion apparatus, consisting of a compressor and a condenser of six tons capacity. Liquid ammonia is compressed to 150 pounds pressure per square inch, 175 pounds on the high side, and 125 on the low. Sudden liberation of the compressed liquid through a valve with a tiny orifice, into the coils of the brine bin, causes it to become gaseous. The gas absorbs heat from the brine, thus reducing its temperature. In the brine tank are 500 feet of $1\frac{1}{4}$ inch coils, and 2600 gallons of 90 per cent salt solution. To insure uniformity of temperature, the brine is kept in circulation by a centrifugal pump, which continually forces it from one corner of the bin to the farthest opposite corner.

After the ammonia gas has absorbed its maximum of heat, it is cooled by being run through a condenser. This has ammonia jackets outside and water coils inside. The same water which cools the condenser is used to cool the compressor, being sent through a cooling tower by the pump used to circulate the brine in the brine bin. The brine in the latter is cooled to about 0° F., and then pumped into the coils of the sardine tanks. There are four of these, each with a capacity of three tons of sardines, and containing 150 feet of $1\frac{1}{4}$ inch brine coils. Circulation of the brine in the coils of the four tanks by the operation of a centrifugal pump, reduces its temperature to 36° - 40° F. The fish are held for cutting in the sardine tanks, and, the tanks being above the cutting tables, are let out through gates in the bottom of these, to be cut in the usual manner.

The brine bin and sardine tanks have double walls, the space between being filled with wood shavings. Their tops are made as air tight as possible, in order to insulate them against the temperature of the surrounding air. It takes about fourteen hours to cool the brine from atmospheric temperature to 0° F., and two and one-half to three hours for the brine after it has reached this temperature to go through the sardine tanks. The refrigeration process is controlled by a thermostat, so that when the brine reaches 0° F., the compressor stops, and when it rises above this temperature, begins to operate. The pumps, however, are not automatic.

Although this system will maintain the prime condition of the fish as received from the boats, it can not, of course, restore sardines already broken or damaged to their original quality.—S. S. Whitehead, California State Fisheries Laboratory.

A TRIAL SHIPMENT OF FISH FROM THE ATLANTIC COAST.

During the second week of April of 1927, the Van Camp Fish Market of San Pedro received a small shipment of fish on consignment from the Atlantic coast. The shipment consisted of the American fresh water

eel (*Anquilla chrysypa*) and the harvest fish (*Rhombus triacanthus*).

This was of particular interest, since the American fresh water eel is not found on the Pacific coast, but only on the Atlantic. The fresh water eel is considered an excellent pan fish in eastern United States, and is of some commercial importance. Also the harvest fish is related to the California pompano. If there is a demand for these Eastern fish, no doubt other shipments will be made.—C. R. Jackson.

A NEW TUNA BOAT.

It will be noted from the January, 1927, number of the Pacific Fisherman that there was unusual activity in construction of fishing vessels along the Pacific coast during 1926. Progress in design, power, and improved equipment is being made at the same time. An example of this activity and progress is seen in the building of the tuna boat, *Lusitania*, which is now nearing completion at San Pedro. It is being built for Joe Rose by the Larson Boat Company.

The *Lusitania* has a cruising distance of 4000 miles, a possible speed of 13 or 14 knots, and a crew of 8 men and 2 officers. The net tonnage is 74, and it has a carrying capacity of 200 tons. The main power plant is a 300 horsepower Western Enterprise Diesel engine. There are two auxiliary engines for running the pumps and generators. The boat measures 101 feet in length, 24 feet in width, and 7 feet in draft. There are two large fish-holds forward and aft, which are lined with cork. The two live bait tanks are 12' x 12' and 13' x 14'. The water to the bait tanks is supplied by two 4-inch pumps. The inflow to the tanks is so arranged that the water is well aerated. There is also a mechanical anchor winch forward, an air compressor and a generator.

New features of equipment embody elaborate provision for comfort, as well as many interesting innovations for efficiency and ease of operation. The crew's quarters are above deck. The galley is aft. The wheel room, chart room, the captain's and mate's staterooms, and the chapel are on the upper deck. These rooms are finished in mahogany.—Carl R. Jackson.

THE SARDINE INDUSTRY.

Even those who live near at hand fail to realize the magnitude of the fishing industries of California. Though the average person may know that sardine canneries exist in California, few realize the size of the pack or the extent of foreign trade. The following excerpts from an article entitled "Oriental Markets," under the authorship of Captain Robert Dollar, well-known shipping man, which appeared in the *Outlook* for May 4, 1927, gives a vivid picture of the export trade in sardines.

"Back of this widespread demand for sardines is a story which typifies what foresight and initiative on the part of an export official connected with one of the fish-canning companies did in bringing about the sale of fish in countries where fish were already bountifully available at prices so small that they can scarcely be calculated in American money.

"Twenty-five years ago this official made a trip to the Far East. In those days such a journey was considered only from the sightseeing angle by manufacturers. Undoubtedly, this man's family, friends, and business associates thought his mind was weakening when he set out for Japan, China and the Philippines with the idea of developing trade for canned goods. Americans at that time knew very little about canned food, and Orientals knew very little about anything that concerned America. This man realized that it would not be feasible for him to force his product immediately on a class of people who had been accustomed to ordering their lives in the same groove for the past thousand years or more. This, however, did not prevent him from personally distributing cans of sardines in native bazaars; anything but a pleasant task, I can assure you, for the smells, yells, and general confusion in the narrow streets and shops that were no bigger than stalls proved a serious handicap when combined with the fact that all business had to be transacted through an interpreter.

"By the time this man had visited bazaars in Japan and China he was pretty well played out and very glad to reach the Philippines. His early enthusiasm had waned, and after a more or less casual interview with an import-and-export firm in Manila he decided to return as quickly as possible to America. Out of his original consignment of sardines four cases remained. These he turned over to the manager of the Manila firm, with the suggestion that they could be distributed in any manner the local representative saw fit.

"A considerable time passed. The canning official returned to America, and was again immersed in the problems incident to the furthering of the sale of his product. A few orders from China and Japan served to reward him in a slight degree for his valiant efforts to introduce canned fish to those countries. One day a letter arrived from Manila requesting the shipment of a hundred and forty-four cases to Singapore. Much as the cannery man prided himself on his knowledge of the Far East, he had to hurriedly consult an atlas to find out just where Singapore was located—remember that was a quarter of a century ago.

"Well, that was the beginning. Year by year the sardine business grew, so that now this same official has but one complaint—he can not average a large enough pack each

year to satisfy the demands. And do not for a moment think that his company has a monopoly on the export of sardines. There are many canneries located along the Pacific coast; Monterey, some eighty miles below San Francisco, is the community where the greatest percentage of fish are caught and packed each season. San Pedro, which adjoins Los Angeles Harbor, also boasts of many factories. The season is from July until mid-March at Monterey, and from November until March at San Pedro. The fish are quite large, are akin to a smelt in size, and for this reason ideal for export.

"There is no need to dwell on the added prosperity this great canning industry has brought to California. An export business of over eleven million dollars a year, which, by the way, constitutes eighty per cent of the entire pack, speaks for itself.

"It seems to me that the manner in which these fish are distributed should be of especial interest; it emphasizes the old, old story, that mass production and mass distribution—no matter how small the retail price of the article may be—is the surest means of building up a successful enterprise.

"The packers ship the fish in wooden cases which each contains forty-eight cans. Oftentimes a single transpacific shipment will amount to over a hundred thousand cases, all of which are destined for the countries of the Orient which lie south of the Philippines, for, strange as it may seem, Japan and China have never acquired a marked liking for sardines. Into the ports of Singapore; Pontianak, Borneo; Batavia, Java; Rangoon, Burma; Colombo, Ceylon; and Calcutta, India, goes a portion of each large shipment. Various export houses in these cities take consignments ranging from ten thousand cases down to as few as fifty. Instead of jobbers, each firm has agents in the more remote inland cities and towns. These agents send in orders for ten, fifty, a hundred cases, as few as a dozen tins, and, in the very small villages, one tin. The majority of stores where the sardines are placed on sale are, to our Western eyes, little more than bamboo-matting huts, which huddle by a jungle roadside or front on some swiftly flowing tropical torrent. To these shops go natives in bright colored garments—Malays, Malay-Chinese, Burmese, Tamils, the Hindus and Mohammedans of a hundred and more races of India; not the coolies, mind you, for coolies live mainly on raw grains and occasionally rice curry; these people who

go to buy are the legion of the lower middle class—tailors, cooks, house boys, farmers, metal workers, and a thousand other types of workers. Rarely, if ever, do they buy more than a single fish! Not a single can—a single fish! Sometimes they bargain for half, or a quarter of the delicacy, according to their affluence. On a large wet leaf, they accept the food of their choosing after it has been covered with a carefully measured amount of tomato sauce. A minute copper piece joins other minute copper pieces in the shopkeeper's tin money box, and up the road strolls the contented purchaser, his eyes asparkle with the feast he is balancing on his upturned palm.

"In the cities better-class natives, such as merchants, office workers, brokers of jute, tea, and rice, go to their favorite shops in the bazaar districts and order a can of sardines, then collect a number of their friends and indulge in an impromptu banquet.

"So it goes. And all because a man had four unwanted cases of sardines in Manila twenty-five years ago. Those four cases at current market figures were then worth something in the neighborhood of twenty dollars—surely a small investment for the founding of such a vast export business.

"There are some people who will say that the growth of the sardine business was a matter of luck. I contend such is not the case—any more so than the success with which half a hundred other American products have met with in the countries of the Far East. It must be borne in mind, however, that this business has come gradually during the past twenty-five years, in the face of terrific competition. Yet once the natives were convinced that the taste of American sardines was superior to any other fish they had ever eaten, they promptly vetoed their home-caught variety.

"This is but another instance of the importance of personal contact in foreign trade. Years of experience in doing my best to promote foreign trade prove that the yearly visits I make to various world centers where I call upon business men who have interests kindred to mine, have done more than anything else to bring to pass the culmination of many of my ideals. And surely, if I, a man with more than fourscore birthdays to my credit, can still exert this amount of energy in behalf of my business, a few younger men can do likewise, with the same results."

LIFE HISTORY NOTES.

A CALIFORNIA BADGER.

I had for years tramped the fir forests and manzanita-covered ridges of the Feather River country, yet my acquaintance with the badger had been limited to glimpses of his tracks in the dust on a very few occasions. So it was that when I rounded a turn in the Forest Service trail one summer morning, and came abruptly upon *Taxidea* in person, I experienced no little satisfaction at having my camera with me.

I found him busily engaged in disinterring the putrid remains of a rattlesnake which I had buried some time before—and was more or less shocked to see him devour the unfragrant reptile as if such things were a

oak and peered up at me intently as I snapped him again. His patience was apparently exhausted after this photo, and he slipped away into the underbrush with considerable agility. I hastily emerged from my scanty concealment to see him running down an open glade with his rapid, shuffling gait, the long hair on his sides standing out stiffly so that from a distance it appeared for all the world like the shell of a turtle.

Three days later I found his furry body lying beside the trail—shot by a villager and tossed aside, a token of the disregard with which mankind tends to view all forms of life save that of his own sacred species.—W. I. Follett, Oakland, California.



FIG. 48. A California badger at home. Feather River Canyon. Photographed by W. I. Follett.

common article of his diet. I was near enough to observe that after he had given the snake's head a crunch or two, however, he spat it out as if its taste were not up to his required standard.

When he had finished the rattler and moved out into an open space, I snapped his picture and endeavored to remain as inconspicuous as possible, hoping that he might give me another opportunity. I was partly hidden from his view, but made a slight noise while changing the film, and he turned sideways to listen, standing bow-legged while I took the next photo. Then, catching the slight movement of my winding the film he backed under a fringe of scrub-

THE RATFISH OR ELEPHANT FISH.

Hydrolagus coliei.

The recent capture, by hook and line, of a ratfish or elephant fish at one of the piers in San Francisco Bay by M. W. Moon, of San Francisco, excited great interest among the local fishermen, who had never seen anything like it. It is a rare fish in the bay, but it is plentiful off southeastern Alaska, its range extending from Monterey northward, where it dwells in cold water at moderate depth, in the north coming frequently near the surface. Its living relatives, which are few, are deep-sea forms.

The newspaper reports, which compared its different parts to different animals were

not far out of the way, for the family to which it belongs, the Chimaeridae and the genus in which itself was once placed, Chimaera was named after a mythical monster of Greek mythology which had the head of a lion, the body of a goat and the tail of a serpent. The generic name which it now bears, Hydrolagus is Greek for water-hare, in allusion to the form of the lips and teeth. Its specific name is for Mr. Collie, the naturalist who first found it at Monterey.

The subclass to which the Chimaeridae or spook-fishes belong is a very ancient one, and what few are now living are survivors of a once extensive group, now represented by fossils. They are generalized types and show relationship to the sharks, the ganoid fishes (sturgeons and garpikes) and the batrachians or group containing the frogs and salamanders. It is a characteristic of generalized forms that they possess traits of both lower and higher groups. Thus the sharks, while their bodily structures, such as cartilaginous skeletons, etc., are lower than those of the bony fishes are, in their methods of reproduction, related to the higher groups, the ova being fertilized internally, and the young either being born alive or produced in eggs with leathery shells. The young, moreover, have external temporary gills like those of the salamanders.

Little is known of the reproduction of the spook-fishes, to which the rat fish belongs, but certain accessory organs indicate that it is like that of the sharks. It is these accessory organs which add to the peculiar physiognomy of the fish and which appear to be misinterpreted in the newspaper accounts.

Attached to the forehead of the rat fish caught is a peculiar knobbed organ beset with prickles; it is known as the frontal clasper, and is a secondary sexual character possessed only by the males. The newspaper account of it as a "breathing" organ was incorrect, possibly misprint for "breeding."

The newspaper accounts also spoke of its having four legs. This reference was to the claspers, forked bodies also beset with briar-like prickles and projecting from near the base of the ventral fins. These are also secondary sexual characters, belonging only to the male.

The probable use of the claspers is suggested by the account of the group given in the Cambridge Natural History: "In its breeding habits, and in the mode in which its eggs are fertilized, Chimaera (including Hydrolagus) probably resembles the oviparous sharks and dogfishes, the eggs appear to be deposited on the sea bottom." Of the breeding of sharks the same volume remarks: "Unlike the generality of fishes, the eggs are fertilized internally as a sequel to the copulation of the sexes. For this purpose the males are furnished with intromittent organs.

The Myxopterygia or so-called claspers which are developed as modifications of the hinder portions of the pelvic fins * * *. When sexual congress takes place the claspers are thrust the cloaca of the female into the oviducal orifices, and in some instances it is probable that they are retained in this position by hook-like tentacles developed at their free extremities. The seminal fluid then flows along these conduits (description of the anatomy omitted in this quotation) into the oviducts, in the upper portion of which meets and impregnates the eggs. After fertilization the egg is enclosed in a dark brown, horny egg-case."

The egg of the different Chimaeras known are enclosed in horny egg cases, some with a long peg-like end where they are probably implanted in ooze, others are covered with silky filaments more or less closely resembling cocoons. Little seems to be definitely known about the eggs of the species under discussion. Dr. Jordan in his book on fishes says that they are fertilized after extrusion. In this case the claspers, described in newspaper accounts as legs, would no longer be functional but there is no doubt about their original purpose.—H. Walton Clark, California Academy of Sciences, San Francisco, California.

DOVES WINTER IN SISKIYOU COUNTY.

Most mourning doves are summer visitors in California but occasionally individuals may be found in winter even in the northern part of the state. About four miles southwest of Yreka, Siskiyou County, along a range of mountains lies a basin of low ground, warm and sheltered. Mullen and an abundance of grasses grow there making feed plentiful and bunches of juniper along one side afford suitable roosting places. Here while on a patrol trip on December 18, 1926, I found about twenty or twenty-five doves. On January 5, I visited their feeding ground and counted eighteen birds. Again on January 16, I saw the birds but they were scattered and I did not count them. On March 10, I saw them again and counted seventeen, but may have missed one. By the middle of April, they had scattered and part of them were feeding in the Oberlin Fort hills. In former years, I have noticed doves in this same place and believe that they winter there. Irregularly old timers here tell me they often winter in this place.—Wm. Lippincott, Yreka, California.

EASTERN CRAYFISH IN SAN DIEGO COUNTY.

On August 13, 1926, six adult specimens of crayfish were taken in a pool in the Escondido River in the northern part of San Diego County. These were turned over to the O'Rourke Zoological Institute of San Diego

and eventually two of them were identified by Dr. Wm. P. Hay at the U. S. National Museum as *Cambarus blandingii acutus* Girard. This is an eastern species ranging from Wisconsin to Louisiana and east to South Carolina. It is presumed that the introduction was made through the medium of a shipment of crayfish made to a local school from an eastern biological laboratory.

Since that date several other specimens have been taken until a total of 15 or more are known. This would seem to indicate that the species is firmly established.—Frank F. Gander.

POSSIBLE DISEASE IN MOUNTAIN SHEEP.

Supplementing the article suggesting disease as being responsible for the death of mountain sheep which appeared in the January number of CALIFORNIA FISH AND GAME, I wish to record the following information:

On February 5th, I took a trip into Deep Canyon near Indian Wells. I saw tracks of a sheep near the entrance to the deep gulch and followed them a considerable distance. Suddenly I came upon the carcass of a female. I could see no evidence of violence practiced by hunters. The pelt was whole and there were no signs of wounds. The animal seemed much emaciated and from the nostrils had come a great supply of mucus which made a puddle in the sand in front of the animal's mouth. It looked as though the animal had not been dead over a few hours. At the time I supposed that

death had come as a result of pneumonia, but I have no proof other than the mucus sign.—Edmund Jaeger, Riverside, California.

THE EASTERN BULLFROG IN SOUTHERN CALIFORNIA.

In CALIFORNIA FISH AND GAME (Vol. 8, No. 4, pp. 219-224) there appeared an article on the eastern bullfrog in California closing with a statement to the effect that it would be desirable to record other cases of introduction and acclimatization. The following note concerns the presence of the eastern bullfrog in southern California.

The first I noticed were at Pet. Phylanax reservoir three or four miles west of Loma Linda and near the Santa Ana River. They were of good size, for I caught some. Two years ago I noticed a few at the Los Serranos Country Club, which is about three miles southwest of Chino. Last year there were a great many there. This place is ideal, for there is a small lake or reservoir stocked with black bass, and this is supplied with fresh, clear running water and surrounded by tules and moss. About three weeks ago some six or seven miles south of Chino on a small stream, a tributary to the Santa Ana River, I found several, do not know how many, but saw six large ones at one deep pool.

These small streams are clear and full of chubs, sticklebacks and freshwater shrimps, but no large fish. These frogs have evidently followed down the Santa Ana and back up the small streams.—F. A. George, Pomona, California.

CONSERVATION IN OTHER STATES.

A NEW REFUGE FOR ILLINOIS.

Nine thousand acres of Illinois River bottomland were saved for the sportsmen of Illinois by the purchase, on April 19th, of a game preserve and public hunting and fishing grounds in Woodford County, across the Illinois River from Peoria. Deeds conveying seventeen hundred acres of land and water to the state of Illinois were accepted on that date by Governor Small and William J. Stratton, director of the Department of Conservation. The purchase of this preserve and shooting and fishing grounds located in the heart of the Rome View Drainage and Levee District caused the dissolution of the district. According to Director Stratton, there can be no reorganization of this district, so that the amount of hunting and fishing grounds actually saved for the people of Illinois by this purchase is close to nine thousand acres. The establishment of forest, game and fish preserves and public hunting and fishing grounds is one of the important phases of the game and fish restoration program now being carried out

by the Department of Conservation.—*The American Field*, April 23, 1927.

GRAYLING NEARLY EXTINCT IN MICHIGAN.

Since 1919 the taking of grayling has been prohibited. The introduction of a bill in the legislature during the session of 1925 served only to attract attention to the fact that this fine fish, now extinct except for a single stream in the Upper Peninsula, is in imminent danger of being entirely exterminated. Fortunately the bill failed of enactment. In September, 1925, an expedition was sent to the Otter River to transfer a number of these fish to lower Michigan in an attempt to re-establish them. The mission of effecting the collection and transfer of these fish was most successful, one hundred specimens in various stage of maturity being planted in a tributary of the Tittabawassee on the state game refuge in Gladwin County, where a small dam and screen were installed to prevent the migration of these fish down stream. Twenty-two grayling were also

delivered to the Grayling Fish Hatchery. Ample protection is afforded them at both locations and it remains to be seen whether the species will propagate in their new environments.

The history of grayling in Michigan reads like fiction. Once so numerous that men not yet old recall instances where they almost choked streams during their migrations, and inhabiting nearly all of the rivers and their tributaries in the northern part of lower Michigan, they gradually but surely disappeared from every stream in this region. Efforts to propagate the grayling at hatcheries met only with failure. Sportsmen familiar with them hold varying views to account for their disappearance, to all of which exceptions can be noted that would disprove these views. Some one has named them the "trout of the pines" and it is literally true that, like the pines, the grayling have succumbed before the advance of civilization.

In a further attempt to re-establish these fish one million of Montana grayling eggs secured from wild fish were shipped to Michigan in June, 1926, through the courtesy of the Montana Fish and Game Commission. The fry were planted shortly after hatching.—Biennial Rpt., Dept. of Conservation, Michigan, 1925-1926, p. 101.

IDAHO FURNISHES SALT FOR DEER.

The use of large quantities of sulphurized salt in big game habitats is an established practice, natural salt licks are becoming scarce through continuous use or made unavailable because of highway extension. It is a notable fact that animals dying from scurvy or tick infection in areas has been eliminated by the use of salt, which keeps the deer and elk in the best of physical condition; a phenomenal increase in numbers has also been noted since the distribution of salt has been taken up.—Eleventh Biennial Report of Fish and Game Warden of the State of Idaho, 1925-26, p. 9.

IDAHO'S GAME REFUGES.

Idaho is reputed to have set aside 3,000,000 acres of game preserves and refuges. This figure is approximately correct when the preserves set aside by statute are added to those created for specific terms under proclamation by the State Game Warden. This area may seem to be disproportionate to the needs of the state but it must be remembered that virtually all of these lands lie within the national forests and are neither privately owned nor subject to location under federal law and therefore merely open ranges, and are therefore not restricting the use of the lands even for grazing purposes. The areas embraced are with but one or two exceptions highly beneficial to the conservation of big game and in no wise defeat the

hunter since all the areas within the national forests are surrounded with hunting grounds of equal or better opportunity during the open seasons.

Four new game preserves were created at the last session of the legislature, namely: Soldier Mountain, Warm Springs Creek, an addition to the Selway, and the Middle Fork Preserves on the Little Salmon River.—Eleventh Bienn. Rpt. Fish and Game Warden State of Idaho, 1925-1926, pp. 33-35.

PHEASANTS INCREASING IN NEBRASKA.

The Bureau of Game and Fish of Nebraska has recently secured a large number of special reports from citizens in all parts of the state on the pheasant, the information being furnished in response to a request from the department. Information was requested as to young birds seen last season in territory where stocking had been done. These reports were gratifying, a large majority having seen broods of young birds. Results of observation as to the food of pheasants were that the following kinds of food were taken, chiefly, in the order named as to frequency and quantity: Insects, waste grain, grain, weed seed, and garden truck. These reports confirmed conclusions from investigations made elsewhere, that insects constitute the favorite food of pheasants when they can be obtained. Grain, and any green stuff they can obtain, is included in the winter diet when insects are not to be had. One question asked was: "Do you consider the pheasant the farmer's friend or enemy?" Nearly 94 per cent of the answers were that the pheasants should be classed as beneficial to the farmer. Many replies referred to the work of the pheasants in cleaning out alfalfa fields, corn fields, gardens, orchards, etc., of grasshoppers. Another point on which information was requested was as to the reputation of the pheasant for pugnacity. Reports were general that the cock pheasant was a scrappy bird, but nearly all those having actually seen the pheasant in combat reported that its adversary was another pheasant or a domestic rooster. Few had seen any evidence of serious disagreement with other game birds.—*The American Field*, April 16, 1927.

THE BRITISH WILD BIRDS PROTECTION BILL.

The Wild Birds Protection Bill which has had the support of the Royal Society for the Protection of Birds has failed passage for the third time. In 1923, it was introduced in the House of Lords by Viscount Grey of Fallodon and passed all the stages in that house, but owing to the change of government, it was shelved. In 1925, it was introduced in the House of Commons by the House Secretary but secured no more than

a first reading, being withdrawn in December owing to the pressure of parliamentary business. In 1926, it was introduced in the House of Lords by Lord Desborough and was passed with but few amendments. It got as far as a first reading in the lower house on the 28th of July but made no progress in the autumn session. Oftentimes, it takes endless patience to secure proper constructive legislation. Conservationists in England will not let the matter drop until better protection is given the birds of the British Isles.

ARKANSAS INTRODUCES BEAVER.

Through the courtesy of Commissioner D. H. Madsen of Utah, four beaver were obtained and planted in Big Lake near Rottaken Spur. Beaver formerly inhabited Arkansas in great numbers, and it is hoped to bring them back in suitable areas.—Sixth Biennial Report, Arkansas Game and Fish Commission.

THE ASSOCIATED COMMITTEES FOR WILD LIFE CONSERVATION IN NEW ENGLAND.

With the formation of the Associated Committees for Wild Life Conservation, made up of representatives from the Massachusetts Audubon Society, the Massachusetts Fish and Game Protective Association, and the Federation of the Bird Clubs of New England, Inc., a real step has been taken in the direction of combining the efforts of these important organizations in such conservation matters as are of common interest to all three. It has been felt for some time by those who have favored this constructive step that much duplication of effort could be avoided, stronger appeals could be made and greater results could be obtained by joint action. This committee will undertake only such conservation work as can be better done by the combined efforts of the three component organizations than by any one of them or by all three acting independently.

It should be distinctly understood that each constituent organization will continue its separate identity and work on the special matters which interest it alone.

The associated committees will from time to time make joint appeals for particular objects so that patrons of the parent organization can support their activities without the confusion which is often caused by a number of appeals from different sources for the same proposition. It should be stated that all funds raised, with the exception of those devoted to the actual expense of carrying on the work, will be employed as stated in the appeals. No compensation whatever is paid to any member of the associated committees.

The associated committees are unanimous in urging:

1. That laws protecting song, insectivorous and game birds must be kept impartially enforced.

2. That reservations and sanctuaries are needed in which all wild life may live undisturbed.

3. That all enemies of our wild life must be kept under control and that the game birds so far as possible should be propagated to increase the number, or at least to fill the places of those taken.

4. That, for economic, educational and recreational reasons, the commonwealth should provide funds from the general tax levy to purchase, maintain, and administer throughout the state suitable breeding, nesting and feeding areas for birds and animals.

5. That if future generations are to enjoy those things which delight the lover of the out-of-doors, be he sportsman or bird lover, the work of conservation must be carried on actively to insure this heritage.

IDAHO'S OPEN SEASON.

Idaho is the only state in the Union which at the present time declares an open season on mountain goat. Over three thousand of these animals are now in the mountains and since their value is for trophies there is little likelihood that they will ever be reduced to a number demanding a closed season. Very few are reported as killed each year and recently checked census show an increase under the present open season.

While the federal authorities report an increase of approximately sixteen per cent in the number of moose, our own figures compiled by deputy wardens show a much larger number of the valuable game animals in our forests. At present no open season is permitted on moose in Idaho and should not be made until the number increases very materially. No disease has been found among moose and there is every reason to believe that they will, under proper supervision, show marked increase in numbers during the next few years.

Elk in Idaho are rapidly gaining in numbers; their range is very wide throughout the state. Federal and state estimates each show remarkable increases and, while Idaho is one of the three states left in the Union which permits an open season on this animal, there is no reason for closing the season here. Approximately 350 elk are killed each year and the annual increase is conservatively estimated at over 500 per year under ordinary weather conditions. At least 6,000 elk are now in the state and a material increase in numbers would seriously endanger their existence because of limited winter range. The largest herds are found in central Idaho on the Salmon River drainages.—Eleventh Bienn. Rpt. Fish and Game Warden of the State of Idaho, 1925-1926, pp. 26-27.

ELK BROUGHT BACK TO OLD HAUNTS IN BLUE RIVER COUNTRY, ARIZONA.

The Blue River country of Arizona, where forty years ago thousands of elk ranged the hills, will once more be the home of a herd of these handsome American big game animals.

The Arizona State Game Department and the Forest Service and Biological Survey of the United States Department of Agriculture and local interests, have just placed a herd of 23 elk on the Blue Range game refuge in the Apache National Forest.

At one time the Blue River country harbored thousands of elk, deer and wild turkeys, and early settlers tell of bringing back six-mule-team wagons loaded with elk killed for holiday feasts. With the entry of the cattlemen and settlers in the country around the headwaters of the Blue and Little Colorado rivers in the early eighties, however, the big game began to disappear. Since the regulation of the ranges was put into effect by the Forest Service, the deer and turkey have come back to some extent, but the last elk was killed in this region, near Mount Ord in 1898.

Although the Indians and settlers did some hunting in the Blue Range, it is believed the depletion of the ranges by dense stocking with cattle was the principal cause of the extermination of the elk.

Before the new herd was turned loose on the Blue Range, the very few local settlers were apprised of the possibility that the elk might do some damage to farm crops in the vicinity should they multiply rapidly, but there was practically no opposition to placing them there. The farmers were enthusiastically in favor of it, and when the elk actually arrived there was a great deal of interest evinced by the local population. Sportsmen in the vicinity contributed toward the cost of establishing the herd. It is expected the elk will again become sufficiently numerous there to furnish a certain amount of hunting each fall to remove the surplus.

The elk liberated in the Blue Range were brought from the Yellowstone National Park. When they were liberated, each one had to be dragged out of the truck with ropes, but once in the open again, they left at a run for the high points on either side of the canyon, appearing little the worse for the trip. There were turned loose seventeen grown cows, two yearling heifers, one two-year-old and three yearling bulls.

The Blue Range refuge comprises one of the largest remaining wildernesses in the Southwest, where, it is thought, crop damage by the elk will remain at a minimum. It is rough country, almost uninhabited, and the newly established herd is expected to thrive.

NEW BIRD REFUGE AND FUR PRESERVE IN ALASKA.

President Coolidge, by recent executive order, has set aside certain areas along the Alaska Railroad as a preserve and breeding ground for muskrats and beavers, and a tract of 14 square miles about the government hotel at Curry, Alaska, which is also on the railroad, as a refuge for the protection of wild birds and game and fur-bearing animals. In the area at Curry fishing will be regulated by the Secretary of Commerce; and the hunting and trapping of birds and game and fur-bearing animals, other than brown and grizzly bears, wolves, and wolverines, will be permitted only under regulations to be prescribed by the Secretary of Agriculture, in accordance with the Alaska game law.

The muskrat and beaver preserve along the Alaska Railroad consists of eight tracts aggregating six square miles, four entirely on the west side, two on the east, and two on both sides, all of them one to two miles long and extending half a mile from the center line. Trapping or otherwise killing these fur animals on the preserve is unlawful except under rules and regulations to be prescribed by the Secretary of Agriculture, but the taking of such other animals and birds there as is permitted under the Alaska game law is not restricted by the new order.

The beavers have been active in building dams in the vicinity of the hotel at Curry, and these have proved attractive to visitors and tourists. Because of their accessibility, these places have been attractive also to trappers, who had started killing both beavers and muskrats for their pelts. The executive order was issued to prevent the extermination of the fur animals along the line of the railroad.

NEW BIRD REFUGE CREATED ALONG SAVANNAH RIVER, S. C.

President Coolidge, by a recent executive order, has set aside a tract of about 2350 acres in Jasper County, S. C., as a preserve and breeding ground for native birds. The area embraces certain abandoned rice lands belonging to the United States abutting on the Savannah River, near Savannah, Ga., and is to be known as the Savannah River Bird Refuge.

The new reservation has been placed under the administration of the Biological Survey of the United States Department of Agriculture. It will be unlawful for any person to hunt, trap, capture, disturb, or kill any bird or wild animal of any kind whatever, or take or destroy the eggs of any such bird, or to injure, molest, or destroy any property of the United States within the limits of the reserve, except under such rules and regulations as may be prescribed by the Secretary of Agriculture.

REPORTS.

VIOLATIONS OF FISH AND GAME LAWS.

FISH CASES.

January, February and March, 1927.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Angling License Act.....	8	\$200 00	-----
Violations of Commercial Fishing License Act.....	5	55 00	30
Trout: closed season.....	10	585 00	-----
Trout: spearing in District 3.....	1	25 00	-----
Striped bass: over limit.....	9	745 00	-----
Halibut: undersized.....	1	25 00	-----
Black bass: closed season.....	6	160 00	-----
Catfish: undersized for sale.....	3	60 00	-----
Sunfish: closed season.....	6	155 00	-----
Eels: salt water, undersized.....	1	20 00	-----
Crabs: undersized.....	6	125 00	20
Crab: sale of meat out of shell.....	1	25 00	-----
Clams: undersized or over limit.....	26	855 00	25
Abalones: undersized or over limit.....	53	1,225 00	-----
Abalones: closed district or season.....	15	450 00	-----
Lobsters: undersized or oversized.....	6	295 00	-----
Illegal night fishing.....	3	130 00	-----
Nets, traps, lines: Illegal possession or use.....	8	300 00	85
Totals.....	168	\$5,435 00	160

GAME CASES.

January, February and March, 1927.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Hunting License Act.....	28	\$570 00	30
Deer: closed season.....	16	800 00	-----
Deer: evidence of sex removed from hide.....	2	50 00	-----
Ducks: over limit.....	4	125 00	180
Ducks: sale of.....	2	50 00	-----
Ducks: closed season.....	3	75 00	180
Doves: closed season.....	2	50 00	-----
Wild pigeons: closed season.....	5	225 00	-----
Quail: closed season.....	12	400 00	100
Pheasants: closed season.....	3	235 00	-----
Rabbits (cottontail and brush): closed season.....	28	720 00	25
Non-game birds: killing and possession.....	34	1,290 00	-----
Bird nets, traps: illegal possession or use.....	2	75 00	-----
Trespass.....	1	25 00	-----
Shooting game from power boat.....	8	250 00	-----
Night hunting.....	18	475 00	275
Guns: possession of illegal.....	2	125 00	-----
Fur trapping regulations.....	1	25 00	-----
Totals.....	171	\$5,565 00	790

SEIZURES OF FISH AND GAME.

January, February and March, 1927.

Pheasant	2
Quail	12
Doves	2
Pigeon	18
Ducks	573
Geese	65
Non-game birds	149
Rabbits	60
Deer meat, pounds	410
Abalones	2,625
Pismo clams	561
Crabs	437
Lobsters, pounds	1,257
Striped bass, pounds	788
Herring, pounds	560
Halibut, pounds	196
Trout	189
Black bass	15
Catfish	6
Sunfish	77
Bird nets	3

STATEMENT OF INCOME.

For the Period January 1, 1927, to March 31, 1927, of the Seventy-eighth Fiscal Year.

License sales:	Detail	Total
Angling	\$37,782 50	
Hunting	61,125 00	
Market fishermen's	5,040 00	
Trapping	888 00	
Wholesale fish packers' and shell fish dealers'	75 00	
Game breeders'	335 00	
Fish breeders'	145 00	
Total license sales		\$105,390 50
Other income:		
Court fines	\$13,913 38	
Fish packers' tax	27,544 05	
Fish tag sales	1,415 09	
Game tag sales	11 43	
Miscellaneous sales	15 00	
Interest on bank deposits	364 65	
Kelp tax	1 15	
Crawfish inspection	31 50	
Total other income		\$43,296 25
Total income		\$148,686 75

STATEMENT OF EXPENDITURES.

For the Period January 1, 1927, to March 31, 1927, of the Seventy-eighth Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Executive and legal.....		\$3,630 00	\$467 89	\$613 96	\$4,711 85
Clerical and office.....	\$290 61	4,570 00	603 52	536 98	6,001 11
Rent.....			2,471 24		2,471 24
Telephone and telegraph.....			885 80		885 80
Postage.....			746 16		746 16
Freight, cartage and express.....			241 13		241 13
Printing.....	513 45				513 45
Automobiles.....	87 74		16 80		104 54
Accident and death claims.....			83		83
Total administration.....	\$891 80	\$8,200 00	\$5,433 37	\$1,150 94	\$15,676 11
Education and research:					
Director and assistants.....	\$38 37	\$1,720 16	\$146 43	\$389 14	\$2,294 10
Publicity:					
Director.....		\$825 00	\$266 26		\$1,091 26
Conservation and protection (patrol and law enforcement):					
Chief and assistants.....	\$49 86	\$1,674 99	\$201 35		\$1,926 20
Clerical and office.....	13 89	1,230 00			1,243 89
Rent.....			107 46		107 46
Automobiles.....	210 66		186 38		397 04
Captains and deputies.....	345 96	36,673 17	28,681 87	\$44 00	65,745 00
Patrol launches.....	262 86	495 00	60 45	3 50	821 81
Protection:					
Lion bounties.....			1,740 00		1,740 00
Lion hunting.....		405 00	135 68		540 68
Statistics and game problems.....	4 61	1,185 00	90 30	10 04	1,289 95
Total conservation and protection.....	\$887 84	\$41,663 16	\$31,203 49	\$57 54	\$73,812 03
Commercial fisheries:					
Chief and assistants.....	\$69 56	\$4,348 48	\$519 87	\$80 83	\$5,018 74
Deputies.....	6 50	5,379 52	1,056 26	3 10	6,445 38
Patrol launches.....	563 61	580 00	686 73	27 51	1,857 85
Laboratory research.....	165 30	5,556 77	1,056 85	859 08	7,638 00
Statistical.....	28 48	1,209 00	174 13		1,411 61
Salmon tagging.....	512 00				512 00
Total commercial fisheries.....	\$1,345 45	\$17,073 77	\$3,493 84	\$970 52	\$22,883 58
Fish culture:					
Chief and assistants.....	\$25 74	\$999 99	\$23 99		\$1,049 72
Clerical and office.....	21 98	960 00	12 40		994 38
Rent.....			557 40		557 40
Automobiles.....	601 03		274 96		875 99
Hatcheries.....	3,930 43	19,167 75	1,734 08	\$4,158 85	28,991 11
Hatcheries, additions and betterments.....				24,013 77	24,013 77
Special field investigation.....	8 20	1,767 50	319 63		2,095 33
Total fish culture.....	\$4,587 38	\$22,895 24	\$2,922 46	\$28,172 62	\$58,577 70
Screens, ladders and pollution:					
Chief and assistants.....	\$6 40	\$2,195 32	\$508 56	\$83 03	\$2,793 31
Game propagation:					
Game farm.....	\$1,083 15	\$1,965 00	\$369 91	\$969 63	\$4,387 69
License commissions.....			\$9,747 08		\$9,747 08
Total expenditures.....	\$8,840 39	\$96,537 65	\$54,091 40	\$31,793 42	\$191,262 86

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake....	Marin	Solano, Yolo.....	Sacramento, San Joaquin...	Alameda, Contra Costa...	San Francisco, San Mateo.....	Santa Cruz	Monterey.....
Albacore.....									11,012
Anchovies.....									19
Barracuda.....									1,906
Bonito.....				1,194	20,743	4,291	375		
Carp.....		2,896		1,377	20,282	4,440			
Catfish.....		50,126					76,016	4,865	35,206
Cutlus Cod.....	285	1,430					156,097	3,626	161
Flounders.....	20,155	9,360	3			2,393	101,012		
Grayfish.....						102	3,529		
Hake.....							2,576	143	727
Halibut.....	30,333				11,742				
Hardhead.....							723,510		1,400
Herring.....	49,237		1,400			1,100	2,572	10,085	61,153
Kingfish.....								30	230,297
Mackerel.....									6,514
Mackerel, Horse.....									
Mullet.....			20,338			633	13,274		2,150
Percn.....	33,375			146	1,028	3,558			64
Pike.....									
Pompano.....									
Rock Bass.....							263,678	185,019	422,732
Rockfish.....	9,910	6,580					80,867	31,293	2,179
Sablefish.....	7,972						125	1,240	4
Salmon.....	58			4,427	8,077	6,363	132,007		220
Sandabs.....		6,790					743,965		55,040,890
Sardines.....									
Sculpin.....								100	241
Sea Bass—Black.....									
Sea Bass—White.....									
Shad.....				156	126	825	2,132		
Shad—Buck.....				17,139	18,069	94,828			
Shad—Roe.....				14,950	15,902	82,695			
Sheepshead.....									
Skates.....		390							1,023
Skipjack.....							96,276		

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927.—Continued.

Species of fish	Del Norte Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Smelt	13,505	79,425	6,095			681	31,218		6,584
Sole						120	2,101,536	6,378	2,372
Spittail					6,891	23			
Striped Bass			50	15,391	50,774	107,981	13,039		
Suckers					513				
Tomcod							250		
Tuna—Yellowfin									
Turbot			308						
Whitebait									
Whitefish	19,431								151
Yellowtail									
Miscellaneous	300			10		325	5,790		503
Total fish	135,261	157,497	28,194	54,790	104,047	310,358	4,555,844	242,779	55,827,511
Crustaceans:									
Crabs									
Shrimps	147,064	496	128,468				41,012,843	458,584	71,248
Spiny Lobsters							103,824		
Mollusks:									
Abalones									300,789
Clams—Cockle			2,250						
Clams—Mixed			13,910						
Clams—Pismo	4,349								
Clams—Softshell			22,920			9,245	12,630		
Cuttlefish							1,171	799	5,799
Mussels							2,918	175	10,865
Oysters—Eastern			2,575				184,580		18,518
Squid									
Totals	236,674	157,593	198,326	54,790	104,047	310,003	5,873,815	302,337	56,164,730

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.
 † 1961 dozen. ‡ 4 dozen. § 11,708 shell oysters. ¶ 839,000 shell oysters. * 2441 dozen. † 752 dozen.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

[illegible]

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927—Continued.

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego	Total Mexican brought into California
Splittail					6,914			
Striped Bass					187,235			
Suckers					513			
Tomcod					250			
Tuna—Yellowfin		113			113	152,684	1,122,541	1,275,225
Turbot					308			
Whitebait					19,582			
Whitefish	13	98,989		8,103	107,105	2,246	6,626	8,872
Yellowtail		3,712	23	921	4,656	69,681	84,544	154,225
Miscellaneous	2,962	28,291	1,444		39,625	7,949	13,463	21,412
Total fish	142,271	92,646,635	148,791	2,808,900	157,272,878	1,682,457	1,808,128	3,490,585
Crustaceans:								
Crabs					11,108,840			
Shrimps					232,292			
Spiny Lobsters	24,830	41,986	3,591	29,001	99,408		570,873	570,873
Mollusks:								
Abalones	6,379				307,168			
Clams—Cockle					2,239			
Clams—Mixed					18,239			
Clams—Pismo	44,971				44,971	5,587		5,587
Clams—Softshell					44,795			
Cuttlefish		91			7,860			
Mussels	91				14,049			
Oysters—Eastern					187,155			
Squid		28,181			46,699			
Totals	218,542	92,716,893	152,382	2,837,901	159,397,633	1,688,044	2,379,001	4,067,045

1 46,660 dozen. 2 850,708 shell oysters.

